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# Engineering and Mining Journal

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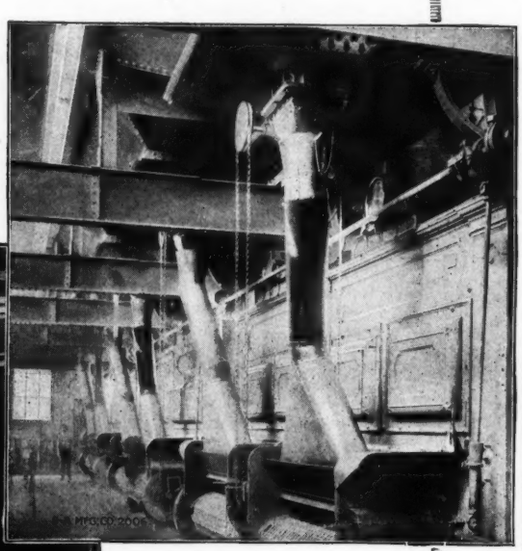

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# Engineering and Mining Journal

January 4, 1919

*Volume* 107 *Number* 1

HERBERT C. HOOVER

BENEDICT CROWELL

# Mining Engineers in the War

By F. F. SHARPLESS


*The achievements of H. C. Hoover at the outbreak of the war are summarized, and tribute is paid to the success of his work as Food Controller in more recent times. Mining engineers have been prominent in every branch of war endeavor, and a great number of them have earned national if not international distinction. In the United States, they have been chosen to fill posts of vast responsibility, and have invariably achieved success. The war activities of the Government bureaus staffed by mining engineers and geologists have resulted in the solution of many problems in connection with the supply of raw material. The prominent American mining engineering societies have furnished a great number of men; and both the profession and its individual members are to be congratulated on their excellent work in matters of national importance.*


UPON the declaration of war between Germany and the Allies, the chaotic situation produced among the tourist population, which we may now recall with some mirth, developed almost over night. London found herself the rather unwilling harborer of many a shipwrecked traveler, men and women without home, food, shelter, or friends, and with nothing in their pockets that resembled real money. Willing as they were, the American consulates and the Embassy found themselves overwhelmed with the care of a disorganized horde of scared women and brainless men. Our Ambassador, in this emergency, thought of an American, well known in London for his capacity and executive ability. He called up H. C. Hoover and asked if he would lend his assistance. He would; and within a few hours Hoover had organized a force, the members of which were busy in financing and moving, in orderly manner, this crowd of lost or strayed Americans.

Hoover was a mining engineer; his relief organization was chiefly of engineers, most of them mining engineers. They were selected not *because* they were mining engineers; they were selected because they had had experiences fitting them for handling any sort of unexpected human, physical, or financial trouble. Many of them had themselves been stranded, lost in darkest Africa, near death's door in half a dozen places, and had tackled and handled successfully much worse situations than the feeding and shipping of a lot of stray sheep in a place where there was plenty of food and lots of shipping. Hoover's assistants were chosen for

their ability; it only happened that they were nearly all mining engineers.

This work having been finished so successfully, it was only a short time until another big organization problem presented itself, one of vast proportion and of complications scarcely conceivable at its inception—the relief of the Belgians. Without a moment's question, this stupendous task fell to Hoover, the mining engineer—a task involving problems of commerce, finance, and diplomacy all conducted under most unfavorable conditions. Again Hoover called for suitable help, and again he found it largely among the mining engineers, men who had met unexpected situations and acquitted themselves with credit. An English critic of the work describes it as "the formation of the largest and most successful grocery business in the world, and it was done in less than six months." This success in Belgium was in no way due to official support from the United States. Indeed, not only were moral and financial support lacking from our Government, but the members of the commission were instructed to get out of the country, instructions that were reluctantly and slowly followed.

Harry E. V. Britton, one of the English founders of the Pilgrim Society, paid tribute to the ability and integrity of mining engineers when he remarked of their work in Belgium: "Your flag has guarded more relief than the philanthropy of the whole world ever dreamed it would be asked to supply. Under the Stars and Stripes a distressed civilian army greater than the combined militant armies of France and Germany is being kept alive. You have pierced the lines of all armies, broken all blockades, and gained the first really decisive victory of the war."

One thing that ought not to be lost sight of is the fact that Germany, after we had entered the war, asked Hoover and his American engineers to continue in charge of the work of Belgian relief, in so great esteem did it hold these gentlemen.

### Control of American and Allied Food Supply in Hands of Mining Engineers

The work of this group did not stop in Belgium; their task grew even greater. With our entry into the war their problem became that of teaching 110 millions of Americans how to eat, so that twice as many millions abroad might not suffer. On Apr. 7, 1917, it suddenly grew from the complete rationing of 10 millions to the education and assistance of 300 million souls. In the group that Hoover drew around him for this work more mining engineers of prominence are found: Edgar Rickard as Hoover's right-hand man, C. W. Merrill as the head of the Chemical Division, Mark Requa of the Oil Division—all are distinguished mining engineers. But we need not dwell on the wonderful accomplishments of the Food Administration: they are fully known to the American public. Hoover leaves it to take up an even bigger work; the rationing of all Europe as well as America. The *Evening Post* of a recent date publishes an article entitled "Hoover in Retrospect." It summarizes the situation in closing with this paragraph: "The American people have come to the point where they would trust him with almost any kind of administration job."

Before this war was started, the Germans knew, and it was not long before the Allies recognized the fact, that this was to be a war of engineers, a war in which production would occupy the attention of a far greater number of persons behind the lines than were engaged in the actual battle, and the mining engineer was perhaps the first to recognize the fact that the occupation of the Belgian and French coal and iron fields was to give their possessor a tremendous advantage in the conflict. He saw his work cut out for him not only in the mines far to the rear, where metals and fuel were produced, but he soon learned that he was also needed right in the very front lines. The building of trenches, and their destruction, have fallen largely to his lot, particularly their destruction from beneath. It has been his business to quietly work his way to a point beneath the enemy, and, there placing his explosive, blow trench and defenders into eternity. This was not a one-sided game; both played it; and every man engaged in the work knew that the deathly quiet around him was no security; that at any minute a mine might be sprung and his whole company be wiped out of existence. It is one of the most useful, dangerous, and nerve-racking occupations that a soldier may engage in.

### The Tunneling of the Col di Lana

It was Gelasio Caetani, an Italian by birth but an American mining engineer by education and profession, who, in three months, tunneled and blew up the famous Col di Lana, an impregnable natural fortress in the Dolomite Alps, held long by the Austrians and at great cost to the Italian besiegers. His countrymen suffering severely, and, failing to take and keep it, Caetani undertook to and did blow out of existence a natural fortress four acres in area. While he was working on this job there were days at a time when over 2000 enemy shells per hour were dropped upon this area, no larger than a city block.

Steps were taken for the formation of a volunteer regiment of engineers in New York on Apr. 3, 1917. Arthur Dwight, who later received his commission as Major, was active in the enlistment of this organization, which later became the 11th Engineers. Many of its members, officers and privates, are members of the American Institute of Mining Engineers. It was a part of the first body of troops sent to the other side, and particularly distinguished itself on the French front during the withdrawal from Cambrai. Busily occupied in railway construction, its members suddenly became aware that the Germans were upon them. Abandoning picks and shovels, and finding guns, it suddenly became a fighting regiment which held its own, the equal of any infantry.

O. B. Perry, later Lieutenant-Colonel Perry, and his associated engineers, are responsible for the formation of that splendid body of men designated as the 27th Engineers, a regiment of miners and mining men, nearly all the officers and many of the privates being mining engineers.

Not only in the Engineering Corps do we find the mining engineers, but they have been received gladly into every branch of the service. We find them as officers in the Ordnance Department, in the infantry, the signal corps, and the flying corps, and again as civilians holding important offices at Washington.

One of the first and one of the most important steps taken in connection with our participation in the war was the formation of the Naval Consulting Board by Secretary Daniels. The board was composed of 25 of the most distinguished scientists and engineers in the country. For some time in advance of our entry into the struggle, its various committees had done much in the way of organization and were hard at work on various problems while we were still discussing preparedness. W. L. Saunders, its chairman, who is responsible for much of its good work, is an ex-president of the American Institute of Mining Engineers. Lawrence Addicks, B. B. Thayer, David Brunton, and Joseph Richards, active members of the board, are distinguished in the professions of mining and metallurgy.

### Engineering Societies Volunteer for Service

Soon after we were informed that a state of war existed, our engineering societies, knowing that they and their members could be of material assistance to the Government in many lines, volunteered their services. The Mining and Metallurgical Society of America, the American Institute of Mining Engineers, and, later, the War Committee of Technical Societies all begged for opportunity of service for themselves and for their members. Recognition from Washington was slow. Lack of organization there and ignorance of the tremendous work in hand prevented early acceptance of the versatile attainments of mining engineers. But things gradually changed, and later we found them not only on the Food and Fuel administrations and on the Naval Consulting Board, but as distinguished members of the War Industries Board, Tax Review, Shipping and Export boards, and of the War Minerals Committee and in the Agricultural Department.

Among the well-known engineers in Washington we note Yeatman, Jennings, Spurr, Potter, Rogers, Thomson, Arnold, Chase, Liddell, Lindsley, Mein, and many more hitherto known only as mining engineers. No more important position was held by a civilian than that occupied by John D. Ryan, until recently Second Assistant Secretary of War and head of the Air Production Board. Though not strictly a mining engineer, Mr. Ryan is so intimately associated with mining and engineering that the profession may rightly lay claim to him, and take pride in the work that he did in bringing order out of the chaos in the Air Production Division.

### Achievements of the Bureau of Mines and U. S. Geological Survey

Congress, the departments, boards, and committees have called upon the Bureau of Mines for help, and the Bureau has given it or has turned to the mining engineers of the country and made liberal use of their voluntary service. In our gas problems it was the Bureau of Mines, with its laboratories, chemists, and engineers, that was prepared and first attacked a subject about which our military authorities knew little or nothing 18 months ago. Likewise the U. S. Geological Survey, with its large staff of trained geologists and engineers, has been of great assistance to the Government in connection with raw-material problems.

Mining engineers have played a very important part and a very vital part in the matter of supplying the Government with its requirements of iron, copper, lead, zinc, chromium, and other necessary metals. In this connection we usually think of the important part that the great metal companies have taken in supplying adequate quantities of metal while operating under the greatest difficulties, not only increasing their production but often developing new sources. Examining this subject a little more closely, we learn that the responsible officials, the men who must get out the metals, the managers and the superintendents, are mining engineers, without whose efficient management, with shortage of labor, inefficiency, and high costs continually staring them in the face, supplies would have been woefully short.

Though, naturally, some reluctance was shown in calling upon civilians to take up military work, the War Department, on the whole, has been open-minded in its actions, notably in the calling of Benedict Crowell to become Assistant Secretary of War, practically Director of Munitions. Mr. Crowell was chosen because of his capacity to work and get results. He is a cutter of red tape when possible and the man to whom the War Department is indebted for much of the rapidity with which it has obtained results. The War Department has also had the benefit of the services of the distinguished engineer D. W. Brunton, as the head of its Inventions Board.

That an ample supply of explosives might be furnished to our forces, and that it might avoid entire dependence upon private manufacturers, the Government has built two large smokeless-powder factories, each costing about $50,000,000, and has placed them in charge of two distinguished mining engineers, D. C. Jackling and S. W. Mudd. The Ordnance Department has claimed the services of Prof. Arthur Walker, of the School of Mines, Columbia University.

### Other War Activities of Mining Engineers

Roughing it is a part of the mining engineer's trade, but to him roughing it means living in comfort while the tenderfoot is suffering all kinds of agony. Campaigning in the dead of winter in a desolated country was the rough situation that had to be faced by many of our allies early in the war. It was the cause of death of some, and of great suffering to many, until Peter Nissen, a mining engineer, conceived and constructed by the hundreds a warm, clean, and comfortable hut that could be knocked down, transported anywhere, and put up again in the twinkling of an eye. He saved hundreds of lives, and added materially to the comfort of whole regiments, simply by knowing how to take care of himself.

An interesting instance of the foresight and resourcefulness of mining engineers in this war is that of Lieutenant Stines and F. W. Draper. Stines was engaged in professional work in Russia at the time we entered the war, and, seeing trouble ahead, knowing that the United States would need all of the platinum that it could secure, and observing that much was going from Russia into Germany in spite of their being at war, he undertook to gather together what he could lay his hands on. He succeeded in collecting about 20,000 oz., approximately a quarter of Russia's normal

annual production. Just at this time Draper was preparing to leave for home, and equipping himself with all official documents procurable he started East with his ton of baggage. Difficulty after difficulty arose, but Draper and the platinum were inseparable: they clung together until the metal was finally deposited in a bank at Yokohama, whence it proceeded on its journey through the customary channels. This gave rise to the story in the daily press of the mining engineer who smuggled $2,000,000 worth of platinum into the States in his suitcase.

### Mining Engineers Take Part in Formulating Policy for Russia

It may not be generally known that mining engineers have taken a very prominent part in connection with our Russian policy. The vocation of these engineers has called them to all parts of Russia and Siberia. They have been in intimate contact with the people of all districts, and possess a perspective of the Russian character, political conditions, and geography held by only a few of the official representatives of our Government. It was the American mining engineer who first suggested commercial intervention with a small army to serve only as a police force; and mining engineers have furnished much of the information upon which Washington is now acting, and they are taking an active part in carrying out the Government plans.

As indicating the activity of mining engineers in the war, it may be mentioned that the English society, the Institution of Mining and Metallurgy, has about a third of its members in service, and that a third of these have been officers with the sappers and miners. This society has lost about 10% of those members who entered the service. The American Institute of Mining Engineers has furnished even a larger number of men in the shorter time that we have been in the war, about 800 out of a membership of 7000.

Recognizing the importance of his work behind the lines, at the source of production of raw materials, recognizing his ability as an adviser and his capacity as an administrator, and also recognizing the necessity of his presence as a miner operating from the front line of trenches, the mining engineer has found himself in a difficult situation. Some have gone to the front and some have stayed behind. To both we owe the deepest debt of gratitude for the unselfish part that each has taken in the place where he thought that he could be of greatest service to his country.

## Chrome Mining in Canada

Prior to the war, the mining of chrome was a declining industry in Canada, says a consular report from Kingston, Ont., dated Nov. 14. From 1910 to 1914 no chrome whatever was mined and the small amount made came from the stocks on hand. In 1915, 12,341 tons was produced, having a value of $179,543, which is an average price of $14.55 per ton. In 1916 production was doubled, with the quantity being placed at 27,517 tons, but with lower average price—$11.32 a ton.

It was stated in the report of the Department of Mines on mineral production for 1915, with reference to chrome, that: "All available sources are being searched for ore, old dumps resorted, prospects and mines reopened, and every little pocket of ore gophered out and sold." Such conditions have continued, and greater diligence has been displayed in securing this ore in large quantities in the Quebec field. In recent months encouragement has been given to producers by offering higher prices for the ore, in the hope of securing greater tonnage.

Ores of all grades have been mined, containing as low as 10% of chrome, to small quantities of rich ore that run as high as 52 and 54% grade. Concentration of low-grade ores has been practiced in Quebec, and ores ranging from 10.50 to 16.30% grade have been raised by concentration to an average of over 50%. The ruling price for chrome ore of 38 to 50% grade was $26.65 per ton for the 38% ore and an increase of 65c. per unit. A large percentage of the chrome mined in Canada has been exported to the United States. The production of ferrochromium in Ontario has begun, and an output of approximately 75 tons a month is expected.

## Magnesite in Greece

Mining has never been of much importance in the Saloniki district of Greece, according to *Commerce Reports*. The increasing demand for magnesite for iron foundries and other industries has led to shipments of this ore during the last two years from the peninsula of Chalcidice. No official information being available showing the quantities shipped to various countries during that period, the following information has been obtained from reliable private sources, and is believed to be accurate.

There are five places where magnesite is obtainable, namely at Yerakino and Cokino Petra, on the peninsula of Chalcidice, quarries northeast and southeast of Vavdos, and at Galatista. The most important of these, the Yerakino mines, have been worked since 1905 and are still far from being fully developed. Before the war, the mine owners calcined practically their total output and then shipped it to Holland, where it was reshipped to different countries. These shipments reached 10,000 metric tons of ore, representing 21,000 tons of the crude ore annually, besides 2000 or 3000 tons of crude ore sent to Italy, France, and Holland. After the outbreak of war, the process of calcination was halted on account of the lack of fuel and the impossibility of obtaining westward-bound freight accommodations.

In 1916, the shipment of the ore to Holland had fallen to 320 tons of crude and 730 tons of calcined magnesite, and 1917 shows no record of sales to that country. Exports to the United States were 12,914 tons of crude ore in 1916, but in 1917 there were none. The British government was the principal purchaser in 1915, 1916, and the first half of 1917, as shipments there reached in that period a total of 40,000 tons, at prices varying from $7.50 to $12.50 per ton f.o.b. Yerakino. Owing to increased cost of labor, machinery and transportation, there has been an increase in price, and on this account since July 1, 1917, practically no new sales in former markets have been made.

**Today is an opportune time to send a check for the Comfort Fund of the 27th Engineers.**

# Impressions of Australia and the Australians*

BY GEORGE C. STONE

DURING my recent trip to Australia, I spent most of my time with one or both of our Australian members, H. W. Gepp and G. Rigg. Gepp is now general manager of the Electrolytic Zinc Co., of Australasia, and Rigg is technical director of the Broken Hill Associated Smelters, both of which companies are controlled by the same interests, so that their work frequently brings them together.

Gepp has done a really remarkable piece of work since he returned to Australasia, having adapted the electrolytic process to his ore and conditions, planned and built his plant, and got it in commercial operation in less than a year. The plant is at Hobart, Tasmania, and is regularly making 10 gross tons per day of spelter running very uniformly 99.996% zinc (by difference). The plant could make more if sufficient power were available. The present cost is low enough to show a profit, which will be much increased when it is possible to operate at full capacity.

### TASMANIA HAS IDEAL SITE FOR POWER SUPPLY

The power is obtained from the Tasmanian government, and the natural conditions are almost ideal. The water supply is from the Great Lake, situated in the central plateau, which has an area of about 50 square miles and a catchment basin of several hundred, with an average rainfall of 30 to 40 in. The present dam is at the south end of the lake, on rock, and is only about 200 ft. long, but it raised the level about seven ft. The dam can be raised an additional 10 ft. by increasing its length to about 500 ft., giving a largely increased storage. If this is done, the head waters of the river Ouse could be diverted into the lake by a canal about three miles long.

The Ouse has nearly as large a catchment basin as the lake and a much heavier rainfall, and its addition to the present supply would increase the available power from about 50,000 to 100,000 hp. The outlet of the lake is the river Shannon, the water of which is diverted to a canal about seven miles from the lake. The canal is about three miles long, through nearly level country, to a large but shallow storage pond, from which the water is taken by pipes with a steep drop to the power station at Wadannanna, on the Ouse, giving an effective head of 1100 ft. Though the Ouse rises a little above the lake, it runs over soft rock and has a fall of over 1500 ft. to Wadannanna, whereas the lake and Shannon, flowing over hard dolomite, fall only about 300 ft. in practically the same distance. The power is three-phase, generated at 6600 volts, and stepped up by transformers to 88,000 for transmission to Hobart, about 70 miles to the south.

When the additional water supply from the Ouse is taken, it is planned to run a canal north from the lake for about seven or eight miles to the north edge of the plateau, where an effective head of 1400 ft. can be obtained only 25 miles from Launceston, the second city of Tasmania. The contract with the Electrolytic Zinc Co. provides for power at a rate of £2 per hp. year. During a trip around Tasmania, I visited a number of mines and smelteries. The first was the old Anchor tin mine, near Lottah, northeast Tasmania, which had not been in operation for some time, but was being put in condition for working. The ore is a hard granite containing about 0.4% of tin. It is overlaid by a light cover of soil, which is put through sluices as it is removed. It pays to sluice it, though it would not pay to work it if doing so did not uncover the ore beneath. The project is to crush the ore with breakers and rolls and treat it on jigs and tables.

The Briseis mine, at Derby, about 15 miles west of Lottah, is the oldest and largest alluvial working in Tasmania. At present work is being carried on under the old bed of the river, which has been diverted—and which the operators expect to move again so as to be able to work under the present bed. The ore is washed down by hydraulic nozzle with a head of 200 to 300 ft. and pumped up to the sluice box by centrifugals, and the tailing delivered by gravity to the dumps in the worked-out end of the cut.

The sluice is a box about 16 ft. wide and 3 ft. deep and 150 ft. or more long. It has riffles about 20 ft. apart reaching nearly to the top of the box; the upper 4 in. of each is removable. The ore settles just below the riffles and the sand beyond it. When the first riffle is full, the top bar is taken off, and the sand allowed to flow over into the second until tin shows at the riffle. The top bar is then replaced. It is worked along in this way until all the riffles are full. The flow is then shut off, and the concentrate, which contains about 70% tin, is taken from the top compartment, and from the next also if clean enough, and shipped. The contents of each lower compartment are then shoveled into the one above, and the operation is resumed. It was claimed that material yielding 3 lb. of tin per cu.yd. could be worked at a profit.

### THE RICHEST TIN MINE IN THE WORLD

The most celebrated tin mine in Tasmania is the Mount Bischoff, at Waratah, in northwest Tasmania. It was by far the richest tin mine in the world, the old "Brown Face" running 40%. The early methods of concentrating were very wasteful, and nearly half the tin was lost. Unfortunately, the tailings were run into the White River, which has a very rocky bottom and a fall of over 2000 ft. to the coast, less than 30 miles away, and the numerous floods have washed them all away. The ore is surrounded by a semicircular dike of barren eruptive, and is composed of slates, pyrite, and gossan, which have been mixed up and overturned in a most remarkable way, the pyrite often being above the gossan. The material mined is all soft, and requires no blasting. There are some very rich pockets, but the ore as a whole only runs about 0.3 per cent.

The ore is taken to the mill by gravity on a cableway about three-quarters of a mile long, with a fall of 500 ft. It is crushed by eight batteries of five stamps each. This is admittedly not economical, but the expense of replacing the stamps by better machinery is not justi-

*Abstracted from an address delivered to the New York section of the Mining and Metallurgical Society of America and published in Bulletin No. 126, Vol. XI, No. 11, p. 328.

fied by the probable life of the mine. The pulp is divided into three sizes, the two coarser going to two-compartment harz jigs, which recover about 60% of the tin as a rich concentrate. The fines from the stamps are classified and treated on tables which recover about 90% of the tin. The jig tailings are recrushed in a short tube mill, classified and tabled. The total recovery is about 80% in a concentrate containing 70% tin. It rains here about 250 days a year. the average precipitation being about 100 inches.

With tin at £160 per ton, the mine can just pay expenses on ore containing 0.26% tin. J. D. Millen, the manager, has done some remarkable work in studying the deposit structurally, chemically, and microscopically. The proof of the value of his work is that he has been paying dividends regularly from a mine that he was sent to close down eight years ago.

### Tasmanian Tin Ore Is Smelted at Launceston

There is a small tin smeltery at St. Helens, on the coast, but it has not been worked for years and probably will not be again. All the Tasmanian tin ore is smelted at the works of the Mount Bischoff Co., at Launceston. The ore is mixed with coal, iron ore, and limestone, and smelted in small reverberatories, giving a fairly pure tin and slags containing 60 to 30% tin. The tin is refined by poling until tests show it is of the proper physical character. The rich slags are resmelted in reverberatories with the addition of scrap iron, limestone, and coke. The resulting slag contains about 2½% tin. The metal is very impure, and is first liquated and then refined, the dross being reworked.

We visited an interesting iron deposit on the Blythe River (N. W. Tasmania). The deposit in places stands above the surface as a high ridge without sides, and test pits have been put in at wide intervals for a mile or more. At all points, the ore is of the same character, a very hard rich blue specular, looking precisely like the ore of Pilot Knob, Missouri.

At Broken Hill, New South Wales, Australia, the mine of the Proprietary is nearly worked out, as this deposit is there only about 400 ft. deep. The whole deposit has proved to be an inverted U, and the largest two deposits are the North and South mines. At the South they are now down 1750 ft., with an unknown depth of ore below them. The lower workings, and drill holes in advance of them, indicate that there is still a large amount of undeveloped ore.

### Selective Flotation Used at Broken Hill

All the mills are using differential flotation. Small amounts of acid and oil, or in some cases acid only, are added, and the lead is floated. The lead concentrate contains 58 to 60% lead and 7 to 8.5% zinc, most of the silver going with the lead. In several cases $SO_2$ is added to prevent the zinc from floating. More acid and oil are added and the zinc is floated. $CuSO_4$ is often added at this stage, 0.20 lb. being said to produce the same effect as 200 lb. of acid. The zinc concentrate contains 47 to 50% zinc, 5 to 7% lead, and 4 to 9% silver.

The recoveries of concentrates vary considerably at the different mines, lead being from 79 to 84%, with an additional 9 to 10% in the zinc concentrate, part of which is recovered. Zinc recoveries of concentrates vary much more, mainly because some do, and others do not, float their slimes. Extractions of zinc are 60 to 83%; 60 to 66% of the silver is in the lead concentrate, and 25 to 30% in the zinc, part of which is recovered.

Several forms of flotation machines are used, most of which are of the well-known types, with mechanical agitation Recently many have adopted the cascade system, with a considerable lowering in cost and without lowering the grade of the product or the extraction. In this the ore pulp is elevated by bucket elevators and flows down through a series of nine boxes, each of which has several nozzles acting as injectors with controlled-air admission. These discharge below the surface of the liquid in the next lower box. The concentrates from the first six are usually shipped and those from the last three are re-treated.

At present no smelting is done at Broken Hill, as all of the mines but the Proprietary, which has its own smeltery, have formed the Broken Hill Associated Smelters, with a plant at Port Pirie. All the lead concentrates produced and part of the zinc concentrates are smelted there.

### The Australian Temperament

The labor situation in Australia is very unsatisfactory. Men are scarce, as many new industries have been started, and there is a great shortage of labor due to the large number of the best men who have gone into the army. Nearly 8% of the entire population of Australia has enlisted, and about 10% of the population of New Zealand. The labor unions have control of the government, and all rates and working hours are by government regulations. The Australian is a curious contradiction. He is violently democratic, but wants a very paternal government and not only submits to, but asks for, an amount of government interference in all of his affairs that would be strongly resented here. He is also very loyal to the Empire, but has a very poor opinion of Englishmen and, in many ways, of England.

The Australian workmen, as far as I could judge in the short time I was there, are not a bad lot and have in general a good idea of fair play. Much of the trouble there has undoubtedly been due to misunderstanding on both sides, and is quite as much caused by the employers not knowing how to treat their men as by the men. In many cases, the feeling seems to be that trouble is inevitable and that there is no use in trying to prevent it. At Broken Hill very little has been done toward making working and living conditions either comfortable or even safe, and Broken Hill is a byword in Australia for trouble. The living conditions are very bad, houses poor and very expensive; change houses, in many cases, have only recently been provided. There are many signs of a change, and it is probable that the next year or two will show much improvement.

### Progress in Improving Conditions of Employees Noticeable

At Port Pirie, the relations of the company and men are remarkably good, having completely changed since the Broken Hill Associated Smelters took control. There, as everywhere, the men had made many demands for more pay and the last was for "a bob [1 shilling, or 25c.] a day," which they received. Soon after, some of the

men came to the management and said, "This extra pay is no use. We got an extra bob a day, and the boarding houses immediately raised their prices three bob a week and all the stores put up their prices; so we are no better off. Help us to live more cheaply." The company at once agreed, and the first thing taken up was firewood, which is both scarce and expensive at Port Pirie. The company bought the wood on a tract of land on the opposite side of Spencer's Gulf, built a landing and put up buildings and water tanks. It then formed a committee, a majority of whom were employees, with a couple of representatives of the company, to arrange for cutting and delivering the wood. This proved of wonderful educational value. Most of such coöperative schemes have failed for one of two reasons: either they were run as a charity by the company, which did not suit the men, or were turned over completely to the men, who did not have the necessary business experience to run them. At Port Pirie they did neither. The representatives of the company were some of its best men, who steered things along rational business lines, letting the men propose arrangements and voting for them if reasonable, and if not starting a debate which lasted until some of the men did make a reasonable proposition. The first trouble at the wood yard was that the men sawing loafed. The committee was shocked and grieved to find that loafing increased the cost, and promptly disciplined the offenders. The next question was delivery. Bids were asked for, and they varied from about 2s 6d to 7s 6d. This was another shock. If they paid more for labor, the wood would cost them more.

The next move was a coöperative shoe store, which has been in operation several months and is saving the average married man about one shilling a day. A small line of clothing has been added, and it is now proposed to build a larger building and increase this department. Any man employed by the company, or a member of his family, and no one else, can buy at this store, but only for cash, and he must take home his own purchases. Arrangements were being made to start a butcher shop, which it was figured would save 2d to 3d per lb. on meat. As the Australians are very large meat-eaters, this will be a considerable item. All of these activities are managed like the wood yard, by joint committees of the company and men. The company advances the necessary capital and receives small interest on it, and everything is sold at cost, plus a small percentage.

The secret of the success is in the character of the men the company has put on the committees. At the Electrolytic Zinc Co., where similar work is under way, the general manager of the company is the chairman of the principal committee and the other representatives of the company are heads of departments.

### Employees Are Granted Vacations on Full Pay

I attended one of the meetings, and was much interested in the way it was worked to make the men take the initiative on rational lines. The men have a good idea of what is fair, and will agree to it. At Port Pirie, a vacation camp is being built, to which the men can go with their families. Any man who has not missed more then 12 days for causes other than physical disability is entitled to two weeks in camp with full pay. In counting absence, if a man notifies his foreman he is debited with the time he is absent; if he does not, he is debited with time and a half. The men at once agreed to this, saying "We get time and a half for overtime work; this is the same thing."

When Port Pirie was laid out, a considerable amount of land was reserved for a park, but nothing was ever done with it until last year, when it was proposed at one of the committee meetings that volunteers give a day's work each and that the company furnish the necessary materials to reclaim part of this land. It was done at once, and they now have an attractive park of about 10 acres. The town employs a couple of men to keep it in order, and if any extra work is required it is done by volunteers, of whom there are always plenty. This year it is proposed to build a children's play ground on an additional 10 acres of this land in one day. When I left, over 4000 men and 1000 women had volunteered for this work. The ground was marked out and the apparatus and buildings (in sections) were being prepared for it. As with the park, the company furnishes the material, but the labor is all volunteer.

Largely as a result of such work, Port Pirie was the only large works in Australia that kept in operation during the big strike last year that closed down almost everything in Australia for weeks.

## Government Operation—How It Works*

The Department of Justice investigators summarize the Hog Island experiment as an "organized riot," a "tangled mess" and a "state of chaos." They assert that the extravagance and mismanagement have been colossal. It was originally estimated that the plant would cost $21,000,000. It has cost over $61,000,000, and is not complete. Labor and time were squandered as well as money. More men were employed than could be used some of the time. Material was ordered and piled up in a congested mass, clogging the railroads until it could be used. The whole thing was a "riot" of extravagance from the beginning.

But—"no criminal responsibility is fixed." Nobody was really to be blamed. It is too bad, but let's remember it was a Government-controlled job; so what else could you expect? Let us say "Tut, tut" to some one and go on clamoring for more governmental industries.

That is the sort of thing which is pretty sure to happen when the Government tries to invade industry. There was, possibly, some excuse for damning the expense in war time, but it did not make for efficiency. When the full story of Muscle Shoal is told—if ever—it will be a similar chapter, and it has a score or more of littler brothers in Federalized industries to come tagging on behind, in figures under the twenty or sixty million class, but enormous in their total.

We see the same thing in the railroads. Even the hardy McAdoo is staggered by the increased costs. So, too, with the express companies, though they haven't yet had time to run up so large a bill. And it will be so with the telephones and telegraphs. Extravagance, "riot" and "no responsibility." It has always been the story of too much government, everywhere. For instance, even in England, the state management of the wires has caused a loss of over $60,000,000 in operation. If we go on, we may even attain the splendid scale of expenses of our own post office!

*An editorial from the New York *Sun*.

## Must the Prospector Go?*

Must the prospector go? We ask this question with real concern, which will, we believe, be shared by countless readers, lest the picturesque character most affectionately if not first introduced into American fiction by Bret Harte should become a memory only. He is a genuine character, not much flattered or exaggerated as he has been pictured by sympathetic artists through the half century from Harte to London.

If no other sufficient reason has been advanced why the Philistine hand of conservation should be withheld from this kindly, romantic figure, one was given when Senator Pittman, arguing against Government ownership, development, and control of the nation's natural resources, said:

"I believe that you would have a development of the minerals now in sight, and you would never find any more minerals that are lying hidden under the ground. I think you would drive away from the West the prospector, a peculiar individual that circumstances have developed in that country, and without whom no mines would have been found. You will drive him to South America, you will drive him to Siberia, to China, to Africa, to everywhere else on earth where there is a reward for individual suffering and initiative."

It may seem over-inclusive for the Western Senator to say that without the prospector "you will never find any more minerals," and maybe had he spoken with more considered thought he would have restricted his list of minerals to gold and silver, or even to gold alone.

The prospector hunts for gold. In dry gravel, over which rivers ran in the dim past, in the beds of living streams, in ledges of gold-bearing quartz, gold, the visible, palpable yellow metal, is what he seeks. He cares little for gold in combination with other metals; even in quartz he wants gold that can be garnered by simple process—"free" or "native" gold, as he calls it.

Your prospector is a lover of nature, a dreamer, a poet. Harte was writing of the "Luck of Roaring Camp," but he might have written thus of the prospector: "Nature was his nurse and playfellow. For him she would let slip between the leaves golden shafts of sunlight; she would send wandering breezes to visit him with the balm of bay and resinous gum; to him the tall woods nodded familiarly and sleepily, the bumblebees buzzed and the rooks cawed a slumberous accompaniment."

The prospectors who discovered all or nearly all the great mines of the Sierras and the Rockies had no knowledge of geology or of the chemistry of minerals; they cast aside all such as useless mental scrap with the saying, "You can see no further into the rocks than the pick goes." Even in this day of improved tools the prospectors' working outfit consists of little more than a pick, shovel and a pan for washing gravel; little else, for their one little burro has other burdens to carry.

There is no hurry in the prospector's day, no unwaiting trains, no itinerary, no factory whistle's call, no ordered time of labor. In pleasant, watered little valleys to be found even high up on mountain flanks, camp, at agreeable intervals, will be pitched, the burro rested and fattened on plentiful, rich grazing; deer or bear shot, its meat dried in the moistureless mountain air; a thumbed copy of Dickens, or maybe Longfellow, read again by the camp fire.

Yet they find much. The prospector who lazily followed a canyon whose stream grudgingly filled his canvas sack with gold dust, bothered by the black sand so heavy that it reluctantly separated from the heavier gold as his pan was dipped and shaken in the stream, came at last, as he knew he would, to the quartz cropping from which, through the ages, wearing water had dragged particles of free gold. But he profited nothing from the Comstock lode, which gave to the world two hundred millions in gold and silver. Probably he did not much lament his lost wealth. He would have been troubled to have given up his vagrant joys for concern in the monster enginery which, with pneumatic or electric drill, blasts of dynamite, roaring hoist works, thundering stamp mills, whirling grinding steel, loosened, broke down, hoisted, crushed, ground a mountain of ore, concentrating the bothersome black sand from which chemists took gold and silver.

The prospectors who located a cropping of a Rocky Mountain ledge carrying free gold sold it gladly enough for a trifle, and were curious, probably, rather than regretful, when they learned that the ledge turned into one of the greatest copper mines in the world. They remained free from the tangle of high finance, from political turmoil and disappointment, from foiled—or fulfilled—social ambition. Their burro yet carried for them an ample store of bacon, coffee, sugar and corn meal; they tramped as much or as little as they liked; and they had no master. If they located a mine, they would, when it suited their fancy, bond it to an impersonal corporation, whose experts would report on its probable value. If they received one ten-thousandth part of that as their reward, it was enough for them. It gave them a month at some grand hotel in Denver or San Francisco; they saw plays, heard opera, impaired digestion with city food, wilted under city air. Then they gladly answered again the lure of the mountains, the better companionship of truer friends, trees, mighty rocks, wild streams whose falls sing sweetly at night.

We hope the old-fashioned prospector need not go.

*From the New York *Sun*.

## Safety Mining Appliances

By A. L. H. Street*

Affirming a judgment in favor of plaintiff for injuries sustained by him through fall of a large and heavily loaded mining bucket in a shaft, due to a defect in the bail, the Springfield, Mo., Court of Appeals lately held in the case of Cole *vs.* D. C. & E. Mining Co., (*204 Southwestern Reporter, 197*), that mine operators are legally bound to cause inspection of all appliances where defects in their condition may imperil mine employees. The court said:

> The general trend of more recent authority is away from the old rule that, the master having purchased a standard appliance from a reputable dealer, he has discharged his duty in the first instance. Undoubtedly regard should always be had for the character of the work and its hazards. No invariable just rule can be conceived. In the purchase of simple tools and appliances to be used in non-hazardous occupations, the master, it seems, has met the requirements when he has supplied the servant with the instruments and appliances of a reputable dealer or manufacturer.

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# A Review of the Work of the War Committee Of Technical Societies

THE War Committee of Technical Societies, which has been operating in close coöperation with the Naval Consulting Board and with the General Staff of the Army, has had its work brought to an end by the termination of the war and ceased to exist on Dec. 31. To understand fully the history of this committee it is necessary to go back to the creation of the Engineering Council by the American Society of Civil Engineers, the American Institute of Mining Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the United Engineering Society, which is described in the bylaws of the United Engineering Society as follows:

> In order to provide for convenient coöperation between the four Founder Societies, for the proper consideration of questions of general interest to engineers and to the public, and to provide the means of united action upon questions of common concern to engineers, the United Engineering Society shall, in addition to its other activities and entirely separate therefrom, establish and maintain a department to be known as the Engineering Council . . . (Par. 116).
>
> The Council may speak authoritatively for all member societies on all public questions of a common interest or concern to engineers, unless objection be made by a majority of the representatives present of one of the Founder Societies or by one-fourth of the representatives present and voting. . .

When war was declared, the engineering and technical men of this country who by reason of age or business restrictions were unable to go to the front began to insist that some means be offered by which they could assist the Government in the study and prosecution of war problems. This feeling, after considerable agitation, resulted in the organization, by the Engineering Council, of the War Committee of Technical Societies at meetings held on June 27 and July 13, 1917. The functions of this committee, as defined by the officers of the Council in their published announcement, are as follows:

> To assist any organization in Washington, such as, for instance, the Council of National Defense, the National Research Council, and the Naval Consulting Board, in any way in which it can bring to the attention of the engineers of the country the necessity for thought and help in the numerous problems that arise in the prosecution of the war.

That the War Committee should cover as broad a field as possible, and afford full facilities to the technical men of this country to utilize their inventive talent for the benefit of the Government, membership in this committee was not restricted to the four great national societies, but other technical organizations were invited to join, with the result that the committee now consists of two members from each of the following societies: The American Institute of Electrical Engineers, the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Mining Engineers, the American Electro-Chemical Society, the Mining and Metallurgical Society of America, the Illuminating Engineering Society, the American Gas Institute, the American Society of Refrigerating Engineers, the American Institute of Chemical Engineers, the Society of Automotive Engineers, and the American Society of Heating and Ventilating Engineers. The American Chemical Society also coöperated, and the officials of the committee were as follows: Chairman, D. W. Brunton; vice-chairman, Edmund B. Kirby; Secretary, Capt. Lloyd N. Scott; Treasurer, Preston S. Millar.

The chairman's report of the activities of the committee states that when the War Committee was first organized, on June 27, 1917, its membership consisted of two delegates from each of the four Founder Societies. Harold W. Buck was chosen as its chairman, and remained in office until pressure of private business compelled him to resign on Sept. 24, 1917. The present chairman was then elected, and as he was anxious to "do his bit," and was too old to go to the front, he has devoted his entire time and attention to the work of the committee since that date.

Finding that the appropriations from the Engineering Council were too small to enable us to work efficiently, continues the chairman, we accepted an offer from the Naval Consulting Board on Oct. 2, 1917, by which we agreed to coöperate with officials of the board, they to provide us with an office, telephone service, and postal privileges. This arrangement has operated most satisfactorily, and under it the two bodies were able to put out a bulletin on "The Enemy Submarine," and later one on "Problems of Aëroplane Improvement." The printing, mailing, and other expenses incidental to the sending out of these bulletins were provided for by the Naval Consulting Board appropriation and approved by the Navy Department.

These bulletins in a measure achieved the desired results, as they placed before the engineers of this country, in concrete form, some of the requirements in both the submarine and aircraft branches of the service and brought to the War Committee and the Naval Consulting Board a much better class of suggestions, ideas, and inventions than they had before been receiving. During the prosecution of the war, new problems of all kinds were constantly coming up in both the Army and Navy, but it was found extremely difficult for us to obtain these at long range.

With the erection and occupancy of the New Navy Building, space was provided for the office of the Naval Consulting Board, consisting of the resident member, who is also chairman of the War Committee, and a staff of examiners, which office was directly connected with the office of the Secretary of the Navy. In this office space was also provided for the work of the War Committee of Technical Societies. This has resulted in the concentration of all work in connection with the Navy Department and has brought the committee in much closer touch with service officials.

The first necessity in successfully maintaining an office at Washington was a capable secretary, but owing to the high cost of living in that city we were unable to find any one with the necessary qualifications for this important office who was willing to volunteer his services. At this juncture the General Staff of the Army offered to aid us by appointing a liaison officer who

should be free to devote half his time to War Committee work.

After due consultation with the chairman and the secretary of the Engineering Council, this offer was accepted, and Capt. Lloyd N. Scott, of the inventions section of the General Staff, was appointed liaison officer to the War Committee; and at a meeting of the board held in New York on Sept. 10 he was elected secretary. This arrangement has proved most satisfactory to the Army, the Naval Consulting Board, and the War Committee, as Captain Scott is a staff officer with a wide experience in engineering and business undertakings, which, combined with forcefulness and tact, has made it possible for him to achieve wonderful results under conditions such as now exist in Washington.

The war problems received from the Army and Navy may be grouped into three classes: (a) Those which are suitable for general distribution to our members by means of bulletins and letters; (b) semi-confidential problems which are sent to selected individuals and groups of inventors who are known to be interested in that particular class of work; (c) strictly confidential problems, the solution of which requires the highest order of technical information, and which can be sent only to carefully selected scientists and prominent inventors whose life study has fitted them for the work in hand.

These problems are always mailed in double envelopes, the outer one giving no trace of its contents, and the inner envelope marked "private and confidential." At present the outstanding problems in Class C relate principally to submarine detection devices, aëroplane instruments, especially those required in cloud and night flying, and liaison devices for communication between the advancing front of an army and the artillery protecting them at the rear.

The War Committee, in sending out both bulletins and letters, requested our members to forward all ideas, suggestions and inventions on naval warfare to the Naval Consulting Board, and on land warfare to the inventions section of the General Staff. The material received in response to our bulletins and letters ranged from aëroplane supercharges, and fuel for high-altitude flying, down to submarine detectors and depth bombs; from long range guns to trench knives; from observation balloons to tunneling machines; and from caterpillar tanks to radium sights.

Up to date, more than 110,000 ideas, suggestions, and inventions have been received and passed upon by the Navy Department and the Naval Consulting Board, either separately or conjointly; and the inventions section of the General Staff, which is a much younger organization, has already handled over 25,000. The crest of the inventions wave for the Navy Department and the Naval Consulting Board was reached in the early months of the war, when the receipts amounted to as high as 600 per day, and that of the inventions section of the Army in July last, when they received 124 per day. All the material received by both organizations is subjected to careful study and consideration by specialists, and those inventions deemed to have merit are immediately sent to the department of the Army or Navy where they can be most readily utilized.

Inventions as received by the Naval Consulting Board and inventions section of the Army may be roughly divided into four classes: (1) Those which have no intrinsic or suggestive value; (2) those which, though having no real value in themselves, suggest new lines of thought and investigation; (3) inventions which have considerable promise, but are not yet developed to a point where it is possible to pass judgment on them; (4) inventions which are sufficiently perfected so that they can be investigated and tested.

Ample facilities for testing inventions of the fourth class are now provided by the Bureau of Standards and Bureau of Mines in Washington. The ideas, suggestions and inventions belonging to classes 2 and 3 are, of course, much more numerous than those of Class 4, and the necessity of providing some means of solving problems and developing inventions has long been apparent. In many instances the inventors have neither the funds, scientific knowledge, nor mechanical skill to perfect their own inventions; hence aid in each of these directions is necessary, that the country may reap the full benefit of the originality of its citizens.

In its financial relations the committee has been singularly fortunate, as, owing to the generous support given by the Navy Department, the Naval Consulting Board, and the inventions section of the General Staff, it has expended only $1843.01 of the $4700 appropriated by the Engineering Council; and all of the funds contributed by organizations not included in the four Founder Societies are still intact in the hands of the treasurer.

The Great War, which has just been brought to such a glorious conclusion, has given us all a realization of the dangers of inadequate preparation for national defense. In no department has this been felt so severely as in the scarcity of engineering officers and the ignorance of military affairs on the part of those that were obtainable. To benefit by past experience we must insist that in every engineering school the students are given a thorough military training. The last war and the wars in future will be engineers' wars, and it is to the engineers that the country must look for officers to supplement the efficient, highly trained but numerically inadequate supply graduated from West Point and Annapolis.

Now that the war is over, the Government can scarcely expect continuous volunteer service from our members, and after consultation with all of the parties at interest it has been decided that though the engineers of this country still maintain their readiness to assist the Government in every possible way, it will be more economical and convenient for the Army and Navy to function with the members of the societies which united to form the War Committee of Technical Societies through the secretaries of these organizations. For this reason the Engineering Council asked that the committee be dissolved on Dec. 31, at which time our appropriations will cease.

Lists of the officials and membership of the societies included in the War Committee have been filed with the War and Navy departments, and their officials have been requested to continue the work which has heretofore been carried on by the War Committee of Technical Societies, through the secretaries of these different organizations, an arrangement which I have no doubt will prove extremely satisfactory to all concerned.

## Monazite-Sand Situation in Brazil

Brazilian monazite sand, which is largely mined in the State of Espirito Santo, is usually sold in either the Rio de Janeiro or the Victoria market, says *Commerce Reports*, although in certain cases sales have been effected at the mines and payment made for delivery at the mines, the sellers quoting the price, for convenience, as of Victoria, bags, bagging, transportation, and export duty included.

Before the war the German trust (Welsbach A. G., Hamburg and Berlin) was the only purchaser of monazite sand and virtually ruled the market. All transactions relative to shipments were conducted through firms in Rio de Janeiro, which had contracts with the trust. At present the only firms engaged in the business and operating their own mines are P. S. Nicholson & Co., Rua Visconde de Inhaúma 8, Rio de Janeiro; H. M. Sloat, Avenida Rio Branco 109, Rio de Janeiro; and the Société Minié, Rio de Janeiro.

The cost of bagging this sand, after it has been mined and stored at the plants, usually averages $4.25, American currency, per ton. However, if the cost of mining, transporting, and concentrating the sand at the plant were to be included with the cost of bagging, it would average between $17 and $23.

During the period when the German trust had a monopoly of the sale of Brazilian monazite sand, the price at Victoria (capital of the State of Epirito Santo) ranged between $21 and $25 per ton. The sand was transported from several beds 60 to 120 kilometers (37 to 75 miles) from Victoria. At present (Sept. 26, 1918) the cost of transportation from the Benevente district to the port of Victoria is $7.50 per ton; from the Guarapary district, $6; and from the Carapebus mines, $5. The only mines now being worked are in the Carapebus district, but work will soon be resumed in the Guarapary district. However, the uniform price for this product, delivered at Victoria, has for some time approximated $25 per unit of thorium, and as sales are all based on the thorium value of the sand, the distance from the mine to the port of shipment does not enter into the calculation of the price.

Stocks of monazite sand at Victoria or Rio de Janeiro are kept at minimum quantities, owing to the fact that storage must be paid, and as a rule the exporters never have on hand at either port more than enough to fill one or two medium orders.

There are no facilities for satisfactorily determining the thorium content of monazite sand in Brazil, and the preliminary estimates of 5% are usually modified up to as high as 6%, or down to as low as 4½%, according to the beds from which the sand is taken.

## Peace Effects on Australian Mines

SYDNEY CORRESPONDENCE

The factors governing future conditions are so many and so uncertain that it is not possible to forecast the effects of peace during the next few years. It is, however, possible to review some of the chief factors that will influence the effects. These are metal prices, labor, materials, transport, and ore grades. The last four named will be the largest factors in deciding the critical metal prices at which it will no longer pay to produce. Although the metal prices will naturally fix themselves at a profit margin above production cost for the rest of the world, such prices may yet be too low to enable Australian mines to be worked profitably. It is recognized that the interim between demobilization and the full resumption of industries may last 12 months or more. A decrease in metal prices during this period has already been anticipated by a general fall in share values of base-metal mines, although not to the level obtaining immediately after the breaking out of the war. Labor will be increasingly plentiful as troops return, and, it is optimistically expected, will become more efficient with the return of the best of the workers, who went to the front.

Wages, however, are unlikely to fall for many years. Materials will become cheaper, as Australian manufactures have increased since the war began. With more ships, imports, so long restricted, will expand. Australia waits for all kinds of American mining machinery and electrical appliances, both for renewals and extensions. Within six months, therefore, it is confidently expected that materials will begin to fall in price. One cause of this will be the increase in numbers of ships and a decrease in ocean transportation cost. The immediate result will be a reduction in the large accumulations of concentrates and metals, enabling past contracts to be fulfilled and new ones to be made.

The last item, ore grade, will remain about the same for producing lead-silver-zinc mines, but will probably diminish for producers of copper, tin, gold and rare metals. On the other hand, the extension of flotation and leaching methods will improve recoveries on existing ores and make lower-grade ores workable.

The harder times to be expected during the next few years will force economy and stimulate production. This means that the larger, lower-grade districts of Australia will have to be exploited on "wholesale" American lines. There is also the natural stimulation to prospecting with the demand for gold and tin. It has been the experience that "new fields" mean rich ones, whether alluvial or lode. When West Australia reckoned returns by the ounce, instead of the pennyweight, there was no complaint of high costs, although, in the early days, they were certainly as high as today; and similarly for tin.

Natural economic laws will convince Australia that her immediate future lies in the production of raw materials, rather than of manufactured goods, except as required for local consumption

## Bamboo Roads in Burma

BY HARLEY E. HOOPER

It often falls to the lot of the mining engineer to build a road cheaply and quickly, and the following description of road construction in Burma may be applicable for use in other tropical localities: In the Tavoy district, Lower Burma, the rainfall during the monsoon season is exceptionally heavy. In the middle of this season, it was necessary to haul wolfram ore over 10 miles of jungle road which the bull-cart traffic had reduced to a series of morasses or bogs. The road was first corduroyed with 3-in. and 4-in. saplings and these were covered with a few inches of laterite.

*Tavoy, Lower Burma.

In carting the laterite, the few good portions of the road were badly cut up and the job was costing about 80 rupees[1] per 100 feet.

Bamboos of 2-in. diameter were split into four and laid longitudinally, at 1-ft. centers, along the road. Similar quarter sticks were closely woven, in sets of two, across the longitudinal strips, two over and two under. The alternate longitudinals were held up while the cross pairs were put in and then tapped back into position. The contract for the road, including the rough leveling, was let at 16 rupees per 100 ft., and 100 coolies could cut and lay 1000 ft. per day. The hard, external part of the bamboo was always laid upward.

To split the bamboo, a rough cross is erected, about three feet above the ground and against a firm wooden frame. The end of the bamboo is slightly split twice with a dah, and the four pieces are thrust through the angles of the cross with a good push.

An elephant hitched to an improvised cart, made from the steel wheels of a portable engine, formed part of the transport kit, and he negotiated the bamboo matting repeatedly, leaving no visible impression. Owing to the naturally uneven length of the longitudinals, the joints are staggered, thus making a continuous semi-elastic mat hundreds of feet long. It is an improvement to pin down the sides, but not an absolute necessity. The sharp curves in the road are covered without any noticeable irregularity in the matting. The mud works up slightly in the softest parts, but the heavy rains wash it down again, and the mat usually presents a clean and orderly appearance. Such a track will last from four to five months, sufficient to see one well through the monsoon period and give a chance for road repairs to be made during the dry season.

## Cost of Explosives

Under the above title there appeared in the *Journal* of Dec. 14 a complaint from a "Gold Miner" regarding the rising cost of explosives during the last three or four years, in the face of a reputed fall in the price of powder for military purposes. Several communications from the explosives manufacturing companies have been received which give reasons for the advance in the cost of mine explosives. These are of sufficient interest to warrant publication, and some of the important paragraphs are quoted below:

From E. I. du Pont de Nemours & Company:

As you know, prior to the war, the high-explosives industry was developed to a high degree, as a result of our activities in the business since the year 1802. On the other hand, the manufacture of military smokeless had been conducted on a limited scale, affording no opportunity for the invention of cost-saving machinery or in process of manufacture.

With the tremendous volume of military business coming to us after the beginning of the European War, we were afforded an opportunity to work out economies previously unthought of. This resulted in a reduction in cost that more than overcame the increasing costs of raw materials, labor, etc.

I believe this explains why there is no connection between the two considerations, but it may be well to state that industrial explosives and military explosives are two separate and distinct manufacturing undertakings. Industrial explosives cannot be manufactured in military explosives plants, nor can military explosives be manufactured in industrial explosives plants.

From the Atlas Powder Company:

It is quite true that as compared with prices existing before the beginning of the European war, prices for dynamite have practically doubled, and the greater part of the advance has been in the last two years. The advances in prices for such explosives were compelled by advances in their manufacturing costs, the increased cost being due to increased price we have had to pay for the material entering into their manufacture, the increased labor costs, increased freight rates on both raw materials and finished products, and numerous other items that have affected the great bulk of commodities produced in this country. We think that reference to prices for such materials as enter into the manufacture of explosives, which have been published in the *Journal* from time to time, will show that practically every one of these materials has increased in price from 150 to 300%, and in some cases even more. You are, of course, familiar with the increase in wages of labor, which has applied to our industry the same as it has to all other industries. To our minds the increase in the price of blasting explosives of about 100%, in the face of increase in the costs of the materials from which such explosives are made, which is from 150 to 300%, indicates that the explosive manufacturers have in no way taken advantage of conditions which have existed, but, on the contrary, have kept down the prices of blasting explosives to the lowest possible figures. This has certainly been our policy, and we will welcome return in prices of these explosives to levels more nearly in line with those existing before the war, as the relatively high prices that have existed recently tend to discourage the consumption of explosives.

From the Ensign-Bickford Company:

We are not in a position to make any comments except as regards our own products; namely, safety fuse and cordeau-Bickford. We are glad to give the following, which we believe will clearly substantiate the absolute necessity for increased prices in the case of safety fuse. On the other hand, it will point out that in the case of cordeau-Bickford, there has been but one raise since the beginning of the European war. This was made Sept. 15, 1915, and is a relatively slight one.

The cost of materials alone for the manufacture of safety fuse has advanced, roughly speaking, in the following proportions: Fuse powder, double; jute yarns, 50%; cotton yarns, four times; cloth, three times; water-proofing materials, double. In addition, the labor cost has advanced at least double, if not more, and the overhead charges have increased correspondingly. On the other hand, taking ordinary double-tape fuse for comparison, on Sept. 1, 1914, the price of double-tape fuse was $5.10 per 1000 ft. list; and it is now $10 per 1000 ft. list. The price of plain cordeau was $42.50 per 1000 ft. list; and it is now $57.50 per 1000 ft. list.

[We are glad to present the replies of several powder manufacturing companies to the question raised by our correspondent. These replies bring forth two important things. The first is that the manufacture of military and mining explosives is conducted along very different lines, and that prices are therefore not comparable. The second is that the increased cost of mining explosives has been brought about by the increased cost of materials, labor, and freight. The last has a familiar sound; we have heard it before. There is no doubt about the cost increases, and, in spite of the rise in the cost of mining explosives, we are inclined to disagree with our correspondent, in the absence of specific proof to the contrary, that the mines have been singled out as legitimate game by the powder manufacturing companies.—EDITOR.]

## Sulphur Committee's Work Completed

Under the general plan of dissolution of the various sections of the War Industries Board, the work of the sulphur and pyrites section of the board has been practically concluded. W. G. Woolfolk is chief of the section. In consequence, the Chemical Alliance's committee on production, distribution, and control of sulphur-bearing materials has ceased to function with that section of the board. This became effective Dec. 11.

**An Emergency Placing of Pumping Equipment, aggregating a total capacity of 20,000,000 gal., was completed in 24 hr. at the Old Dominion mine, in Arizona, according to its report for 1917, with the exception that the transfer of a cable from one shaft to another was not finished.**

[1]The present value of the rupee is 1s. 6d., or about 36 cents.

# Consolidating the American Engineering Professions

By A. D. FLINN*

THE organization of engineers in America is chaotic, complex, and illogical. As consequences there are confusion, waste, inefficiency, and dissatisfaction, which, however, are exaggerated in some minds. If no associations existed, it would be relatively easy to plan and create a system of organization that would satisfy demands much more effectively than does the present multiplicity of unrelated societies. But there have grown with the years traditions, and loyalties, and prejudices, clustering about the societies that now are. An answer to the problem thus created is not easy. To me the solution is not obvious, but some progress in the process is now appearing. There must be extensive consolidations, more federation, and much simplification, each of which demands elimination. Steps are being taken, or preparations made for them, in various ways and places, and by a number of agencies. They will be accelerated as their benefits gain appreciation; but education, time, and patience are needed for attaining the goal.

## The Problems Confronting a Consolidation Scheme

What are the present desirable limits to consolidation and federation? To what goal should they tend? By what methods and means can they best be brought about? These and similar questions are not being answered conclusively, because the necessary facts are not in hand. We have been muddling along in an unengineering fashion, attempting to plan and design and specify without a survey. On Sept. 12, Engineering Foundation by formal vote proposed to make the much-needed survey and preliminary studies, the four Founder Societies concurring. Of the necessity for this survey I have been more deeply convinced with the passing weeks, as I have listened to ineffective arguments and to misstatements based on ignorance which can be corrected only by the results of the proposed survey of engineering organizations.

Without the enlightenment of such a survey it now seems that the following elements of organization are desirable for the engineering profession in America: Excepting possibly three or four cities having large numbers of engineers, there should be in each community, having a sufficient group of technical men to be organized, one organization that embraces them all. Reasons for this are obvious. This organization may be an association of local societies and sections of national societies, or it may be a society admitting to its membership men of all branches of the profession. Examples of both forms of organization exist in a number of places. Local organizations should have large measures of autonomy, but should conform to approved types and standards.

Logically, the next step in organizing would be the combining of these local organizations into one or a few national societies, so that the loyalty, interest, comradeship, and activities naturally developed by the local organizations would flow to the national societies. But at this step the difficulties increase. Many engineers cannot become active members of local organizations, because of distances from headquarters; others do not desire local membership. If there were only one national society, many of the difficulties of scheming a system of organization would disappear; but there are, and probably for some years will be, several national societies of importance, and in each local organization there will be members of two or more national societies. A number of plans have been submitted to me for overcoming these difficulties. None is wholly acceptable. These problems lie at the bottom of the tasks of the committee on development, of the American Society of Civil Engineers, and of the committee on aims and organization, of the American Society of Mechanical Engineers, and similar committees which may be appointed by other societies. Many engineers are giving them earnest thought.

There are said to be approximately 400 organizations of engineers in America, of various kinds. Of these, about one-quarter are the leading national societies and their local sections. In general, the remaining societies have no official relationship, excepting the associations of local societies and sections in a few communities. Consequently the engineering profession, before the public and Government, has no one organization which represents it as a whole, as have the medical profession, the lawyers, the chemists, the architects, the Chamber of Commerce and even labor. In the memberships of the Founder Societies, aggregating 35,000 engineers, there have been variously estimated to be only one-third to one-sixth of the total number of engineers in the country. The engineering profession lacks solidarity.

## Engineers Have Exceptional Facilities

Not a little of the dissatisfaction voiced in various quarters as to the shortcomings of the national societies grows out of ignorance or lack of apprehension of benefits actually received. In no small measure the complainants are at fault in not making better use of the facilities provided and the means of information put within their reach. Furthermore, some important benefits of membership in large technical societies are intangible and not capable of definition; not a few persons overlook these. Nevertheless, there are causes for reasonable dissatisfaction. The societies are endeavoring to remove these as they are recognized and remedies can be found. Humanity and its institutions will never be wholly rid of dissatisfaction, and to this truism engineers are no exception.

In this connection, a quotation from the presidential address of Charles T. Main to the American Society of Mechanical Engineers, December, 1918, is interesting reading:

> In the *Monthly Bulletin* of the American Institute of Mining Engineers, March, 1918, there appeared the following:
>
> "The vision dwells in the minds of many that ultimately these four great societies, lightening the emphasis they place upon their differences, may see the time when, for the solidarity of the

*Secretary, Engineering Council.

profession, for their best interests, as well as for the increase of their influence on the country at large, they may become one great national association of engineers. With the gain in power and prestige inevitably following such an aggregation, freedom for individual development may be achieved through divisions along the lines of technical interests, which might either follow the present four grand divisions or be more minutely subdivided.

"An organization of this sort could and probably would be more strictly professional than any of the four have been heretofore, and through the prestige and power of its numbers could establish standards of ethical conduct for its members, violation of which would bring grave consequence."

This great vision is worthy of the most careful consideration and might be carried with safety to a point where the national societies would be gathered in under one executive head, without any one losing any vital portion of its individuality.

This would be a great step in advance and perhaps as far as we should go for some time to come.

Whatever scheme of organization be ultimately selected, it must be flexible, so as to meet successfully constantly changing conditions, and it must provide for both technical and social requirements of the membership, while maintaining high standards. "Social requirements" is here used to mean, in addition to social intercourse among members, services of the organizations to Government and to the public, and services to engineers individually, such as assistance in securing engagements and better standing in corporate and governmental employment. Technical and social functions probably will be best kept distinct. Some engineers even suggest separate organizations; but at present prefer separate departments of one organization or of a federated group of organizations.

### The United Engineering Society

So far as known, none of the leading organizations has stated a definite policy on these questions. Opinions herein expressed are only personal. The statements in this paper are merely a contribution to the general discussion of this subject by one who for several months has had especial opportunities for learning the opinions of others and gathering a little information.

As regards the joint activities of the American Society of Civil Engineers, the American Institute of Mining Engineers, the American Society of Mechanical Engineers, and the American Institute of Electrical Engineers, the present organization seems involved; and even some members of the governing bodies of these societies have difficulty in keeping relationships straight. It is, however, not so complex as some persons assume. It may be simply stated as follows: The four Founder Societies named have joined in creating the *United Engineering Society* to hold and administer property and to perform other broad functions for them. At their request the United Engineering Society has established three departments, the Library Board, the Engineering Foundation, and Engineering Council.

*The Engineering Societies Library* has possibilities for active usefulness to the engineering profession and to the industries of this country. Its present passive services are good and of great value, but the library can do much more. Funds are needed at once for complete re-cataloguing of the books, for strengthening the collection of books, and for instituting new lines of service. The books of the societies have been brought together, but they have not yet been assembled as one library. Never, except during the war, has it been so important that all useful recorded technical information should be fully and quickly accessible to engineers —not only to those in the New York district, but also to those scattered throughout the whole land.

*The Engineering Foundation* now has an endowment of $300,000, yielding an annual income of $15,000. It rendered vital financial assistance to the National Research Council at the latter's inception in 1916, and for the year terminating in September, 1917. That council performed services of great importance to the Government during the war. For the future it already has in hand many projects. One of the most important of these is the promotion of industrial research, in which the Engineering Foundation is coöperating. The Engineering Foundation investigated a scheme for spray camouflage of ships; is conducting long-time tests on the wear of gears, and is making a research on the selective control of wireless communication. It has offered to undertake a "survey of existing engineering organizations, and from information thus developed to formulate a series of constructive recommendations which may be serviceable in guiding the further development of local and national engineering organizations, in their relations to the profession of engineers, to the public, and to one another." Other projects are being studied, but cannot yet be announced. Engineering Foundation's policy is to devote its energies and resources to undertakings of broad application, such as bringing about and stimulating coöperation among existing agencies engaged in research and outlining programs and organizations for research in specific fields.

*The Engineering Council,* since its organization meeting on June 27, 1917, has made progress in exploring its proper field of activity and fixing some of its boundaries. It has accomplished much useful but negative work. In other words, its rejections have been important and have consumed much time. But there are noteworthy constructive achievements, also, on the credit side of its records. During hostilities the Council rendered no small aid to the Government through the American Engineering Service, which procured thousands of engineers for the War, Navy, and other departments, and through the War Committee of Technical Societies, which assisted the Naval Consulting Board and the Army General Staff in examining scores of thousands of suggestions for naval and military devices. Through efforts of its public affairs committee, the Council aided in having the military draft adjusted to permit the continuance of training in the engineering schools of the vitally necessary technical men. Through the industrial affairs committee vigorous opposition was offered to "anti-efficiency legislation" in Congress. Ten days after the signing of the armistice, the Engineering Societies Employment Bureau, with the four Founder secretaries as its board of directors, was substituted for the war-time American Engineering Service. The fuel conservation committee acted in a consulting capacity to the Fuel Administration and the Bureau of Mines in securing war economies, and is continuing its much-needed services into the era of peace. The water-conservation committee is prepared to promote right, and to oppose wrong, national or state governmental actions relating to water-power or other utilization of water, by supplying statements of facts rather than joining in controversial support or opposition of any particular measure. The license committee, with members judiciously distributed throughout the

country, is collecting information on the licensing of engineers by the various states, and is preparing to render proper assistance in these matters whenever needed. The patents committee, coöperating with other similar bodies, is preparing important action for the improvement of the patent law and practice. During the spring and summer, the secretary visited groups of engineers representing the local societies and sections of national societies in 20 different cities from the Atlantic seaboard to the Pacific Coast. In 30 or more communities local correspondents have been selected for direct communication between Engineering Council and engineers at distances from headquarters. Furthermore, important projects of interest to all engineers are in preparation and may soon be announced. One of these is the formation of a national service committee, which is to have an office in Washington, as the representative of American engineers at the national capital.

All aims and endeavors of engineers through their national and local societies and their joint instrumentalities must be pervaded by a sincere spirit of service, not alone of one to another, but by all to the community, the state, and the nation. Such public service by engineers, architects, chemists, scientists, doctors, lawyers, and clergymen is our professional obligation, the *noblesse oblige* of a free and democratic people. Each profession has its distinct service to perform. In each profession there are big men and small men; each must contribute according to that which he has. Service is the only true stepping-stone to that eminence which alone is worth attaining. Greater opportunities have never opened to American engineers than those which confront them in these rapidly passing years of war and "reconstruction."

## Santa Gertrudis Co., Ltd.

The annual report of the Santa Gertrudis Co., Ltd., for the year ended June 30, 1918, shows that a profit of £112,544 5s 1d was made during the period. Dividends absorbed £131,350, and directors' remuneration, £1125 8s 10d. The company's holdings in the Cia. de Santa Gertrudis and the Cia. Beneficiadora de Pachuca remain unaltered.

At the property of the Cia. de Santa Gertrudis, 324,652 tons of ore was sold, containing 24,251 oz. gold and 4,316,901 oz. silver. Ore disclosures during the year were of little importance and have not added materially to last year's estimates of reserves. Operating costs increased slightly, but this was more than offset by the higher price of silver.

Milling operations at the plant of the Cia. Beneficiadora de Pachuca averaged 80.7% full capacity. The reduction was due to a shortage of cyanide, and, later, to difficulties in the operation of the settling and filtering plant. Additional equipment is now being considered. During the year 324,762 tons of ore was treated, from which a recovery of 21,856 oz. gold and 3,775,745 oz. silver was obtained. The recovery is given as 87.95%, but as this is based on the combined value of the product, as compared with the combined value of the metals in the ore, and will vary according to the fluctuations in the price of silver, the information is of economic interest only.

Flotation experiments were concluded, with results which showed that the process, in its present stage of development, cannot compete commercially with cyanidation for the treatment of the company's ore. Aluminum is now being used in place of zinc dust for precipitation purposes. A considerable saving is already assured, which will be increased as operations are extended.

## Method of Securing Anchor Bolts

Neat cement poured around anchor bolts and allowed to set for three weeks develops such a tenacity that the bolts will break under tension before they loosen. Where a machine must be "anchored" to its foundation bed and ready to operate within a few hours, the use of molten lead to hold the anchor bolts securely is unquestionably the better method, as its full strength is developed as soon as it has cooled. In setting up horizontal air compressors and similar machines which develop a constant vibration when in operation, and as a consequence produce strain on the anchor bolts, the lead shows a tendency to become compressed in the direction of the movement. Thus in time a slight movement of the machine upon its foundation when running will be noticeable. Cement, on the contrary, has the property of becoming harder the longer it sets, and so "improves with age."

To demonstrate this, a series of tests was recently made by A. L. Sweetser. Holes were drilled to a depth of three feet in hard limestone rock, and half of the bolts were set in lead and the remaining half in portland cement. The anchor bolts were ¾ in. in diameter. At the end of three weeks a 20-ton hydraulic jack was used in an attempt to "pull the bolts." Those imbedded in lead started to loosen under a load of 12 tons, whereas the bolts in the cement did not loosen at 17 tons and in fact broke before the load reached 20 tons. The experiment proved that for reliability, strength, and simplicity in use cement is unquestionably preferable to lead.

## Butte & Superior Mining Co.

The report of the Butte & Superior Mining Co., for the third quarter of 1918 shows that 108,182 tons was milled, as compared with 114,716 tons for the previous three months—a decrease due to shortage of labor and the inexperience of green miners. The percentage extractions and the grade of concentrate produced were both slightly higher; and metallurgical results during the latter part of the period of review were such as to justify the prediction that future extractions would be materially improved. The increased extraction of zinc, in concentrate form, from 90.925 to 91.133%, is of especial interest because the improvement has been made despite the fact that the zinc content in the heads has decreased from 16.242 to 15.647 per cent.

A further increase in mining and milling costs is noticeable, and is largely attributable to the fact that an advance of 50c per day in the wage scale was made at the beginning of the quarter.

**Graphite Exports From Ceylon** to the United States, as given in *Commerce Reports*, amounted to 801 tons in the second quarter of 1918, compared with 4862 tons in the corresponding quarter last year. The decrease is due obviously to the restrictions of the War Trade Board.

# The Fluid Ton

By A. W. ALLEN

*The need of a definite term to designate a mass fluid unit, in connection with the assaying of cyanide solution containing gold and the rapid calculation of dilution ratios, resulted in the formulation, by Rand metallurgists, of a new unit of measurement. Ten years or so ago the fluid ton, then used for the first time in conjunction with the short ton of 2000 lb., was defined as the amount of solution or water occupying 32 cu.ft. The idea was favorably received, and the new unit has been adopted, in connection with certain industries, in all English-speaking countries.*

THE accompanying tables are presented in order to familiarize engineers with the characteristics of a comparatively new unit, and to serve as a means for the ready conversion of gallons and cubic feet into fluid tons, and *vice versa*. There has been an urgent need for a convenient unit to represent large amounts of water or solution in many phases of engineering. The value of the fluid ton in this connection has been recognized in wet-metallurgical operations, and its use might well be extended.

An ore is generally reduced by crushing and grinding operations in a water or solution medium, and, almost invariably, its weight is recorded and it is assayed or analyzed for metal content on the basis of

TABLE I. CUBIC FEET AND APPROXIMATE FLUID TONS

| Cu.Ft. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | ..... | 0.03 | 0.06 | 0.09 | 0.12 | 0.16 | 0.19 | 0.22 | 0.25 | 0.28 |
| 10 | 0.31 | 0.34 | 0.37 | 0.41 | 0.44 | 0.47 | 0.50 | 0.53 | 0.56 | 0.59 |
| 20 | 0.62 | 0.66 | 0.69 | 0.72 | 0.75 | 0.78 | 0.81 | 0.84 | 0.87 | 0.91 |
| 30 | 0.94 | 0.97 | 1.00 | 1.03 | 1.06 | 1.09 | 1.12 | 1.16 | 1.19 | 1.22 |
| 40 | 1.25 | 1.28 | 1.31 | 1.34 | 1.37 | 1.41 | 1.44 | 1.47 | 1.50 | 1.53 |
| 50 | 1.56 | 1.59 | 1.62 | 1.65 | 1.69 | 1.72 | 1.75 | 1.78 | 1.81 | 1.84 |
| 60 | 1.87 | 1.90 | 1.94 | 1.97 | 2.00 | 2.03 | 2.06 | 2.09 | 2.12 | 2.16 |
| 70 | 2.19 | 2.22 | 2.25 | 2.28 | 2.31 | 2.34 | 2.37 | 2.41 | 2.44 | 2.47 |
| 80 | 2.50 | 2.53 | 2.56 | 2.59 | 2.62 | 2.65 | 2.69 | 2.72 | 2.75 | 2.78 |
| 90 | 2.81 | 2.84 | 2.87 | 2.90 | 2.94 | 2.97 | 3.00 | 3.03 | 3.06 | 3.09 |
| **Cu.Ft.** | **000** | **100** | **200** | **300** | **400** | **500** | **600** | **700** | **800** | **900** |
| 0 | ..... | 3.12 | 6.25 | 9.37 | 12.50 | 15.62 | 18.75 | 21.87 | 25.00 | 28.12 |
| 1,000 | 31.25 | 34.37 | 37.50 | 40.62 | 43.75 | 46.87 | 50.00 | 53.12 | 56.25 | 59.37 |
| 2,000 | 62.50 | 65.62 | 68.75 | 71.87 | 75.00 | 78.12 | 81.25 | 84.37 | 87.50 | 90.62 |
| 3,000 | 93.75 | 96.87 | 100.00 | 103.12 | 106.25 | 109.37 | 112.50 | 115.62 | 118.75 | 121.87 |
| 4,000 | 125.00 | 128.12 | 131.25 | 134.37 | 137.50 | 140.62 | 143.75 | 146.87 | 150.00 | 153.12 |
| 5,000 | 156.25 | 159.37 | 162.50 | 165.62 | 168.75 | 171.87 | 175.00 | 178.12 | 181.25 | 184.37 |
| 6,000 | 187.50 | 190.62 | 193.75 | 196.87 | 200.00 | 203.12 | 206.25 | 209.37 | 212.50 | 215.62 |
| 7,000 | 218.75 | 221.87 | 225.00 | 228.12 | 231.25 | 234.37 | 237.50 | 240.62 | 243.75 | 246.87 |
| 8,000 | 250.00 | 253.12 | 256.25 | 259.37 | 262.50 | 265.62 | 268.75 | 271.87 | 275.00 | 278.12 |
| 9,000 | 281.25 | 284.37 | 287.50 | 290.62 | 293.75 | 296.87 | 300.00 | 303.12 | 306.25 | 309.37 |

TABLE II. FLUID TONS AND CUBIC FEET

| Fluid Tons | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | ..... | 32 | 64 | 96 | 128 | 160 | 192 | 224 | 256 | 288 |
| 10 | 320 | 352 | 384 | 416 | 448 | 480 | 512 | 544 | 576 | 608 |
| 20 | 640 | 672 | 704 | 736 | 768 | 800 | 832 | 864 | 896 | 928 |
| 30 | 960 | 992 | 1,024 | 1,056 | 1,088 | 1,120 | 1,152 | 1,184 | 1,216 | 1,248 |
| 40 | 1,280 | 1,312 | 1,344 | 1,376 | 1,408 | 1,440 | 1,472 | 1,504 | 1,536 | 1,568 |
| 50 | 1,600 | 1,632 | 1,664 | 1,696 | 1,728 | 1,760 | 1,792 | 1,824 | 1,856 | 1,888 |
| 60 | 1,920 | 1,952 | 1,984 | 2,016 | 2,048 | 2,080 | 2,112 | 2,144 | 2,176 | 2,208 |
| 70 | 2,240 | 2,272 | 2,304 | 2,336 | 2,368 | 2,400 | 2,432 | 2,464 | 2,496 | 2,528 |
| 80 | 2,560 | 2,592 | 2,624 | 2,656 | 2,688 | 2,720 | 2,752 | 2,784 | 2,816 | 2,848 |
| 90 | 2,880 | 2,912 | 2,994 | 2,976 | 3,008 | 3,040 | 3,072 | 3,104 | 3,136 | 3,168 |

TABLE III. U. S. GALLONS AND APPROXIMATE FLUID TONS

| U. S. Gallons | 0 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | ..... | 0.418 | 0.835 | 1.253 | 1.671 | 2.089 | 2.506 | 2.924 | 3.342 | 3.760 |
| 1,000 | 4.177 | 4.595 | 5.013 | 5.431 | 5.848 | 6.266 | 6.684 | 7.102 | 7.520 | 7.937 |
| 2,000 | 8.355 | 8.773 | 9.191 | 9.608 | 10.026 | 10.444 | 10.862 | 11.279 | 11.697 | 12.115 |
| 3,000 | 12.533 | 12.951 | 13.368 | 13.786 | 14.204 | 14.622 | 15.039 | 15.457 | 15.875 | 16.293 |
| 4,000 | 16.710 | 17.128 | 17.546 | 17.964 | 18.381 | 18.799 | 19.217 | 19.635 | 20.052 | 20.470 |
| 5,000 | 20.888 | 21.306 | 21.724 | 22.141 | 22.559 | 22.977 | 23.395 | 23.812 | 24.230 | 24.648 |
| 6,000 | 25.066 | 25.483 | 25.901 | 26.319 | 26.737 | 27.154 | 27.572 | 27.990 | 28.407 | 28.825 |
| 7,000 | 29.243 | 29.661 | 30.079 | 30.496 | 30.914 | 31.332 | 31.750 | 32.168 | 32.585 | 33.003 |
| 8,000 | 33.421 | 33.839 | 34.256 | 34.674 | 35.092 | 35.510 | 35.927 | 36.345 | 36.763 | 37.181 |
| 9,000 | 37.598 | 38.016 | 38.434 | 38.852 | 39.270 | 39.687 | 40.105 | 40.523 | 40.941 | 41.358 |

TABLE IV. FLUID TONS AND APPROXIMATE U. S. GALLONS

| Tons | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | ..... | 239 | 479 | 718 | 957 | 1,197 | 1,436 | 1,675 | 1,915 | 2,154 |
| 10 | 2,394 | 2,633 | 2,872 | 3,112 | 3,351 | 3,590 | 3,830 | 4,069 | 4,309 | 4,548 |
| 20 | 4,787 | 5,027 | 5,266 | 5,505 | 5,745 | 5,984 | 6,224 | 6,463 | 7,602 | 6,942 |
| 30 | 7,181 | 7,420 | 7,660 | 7,899 | 8,139 | 8,378 | 8,617 | 8,857 | 9,096 | 9,335 |
| 40 | 9,575 | 9,814 | 10,053 | 10,293 | 10,532 | 10,772 | 11,011 | 11,250 | 11,490 | 11,729 |
| 50 | 11,968 | 12,208 | 12,447 | 12,687 | 12,926 | 13,165 | 13,405 | 13,644 | 13,883 | 14,123 |
| 60 | 14,362 | 14,602 | 14,841 | 15,080 | 15,320 | 15,559 | 15,798 | 16,038 | 16,277 | 16,516 |
| 70 | 16,756 | 16,995 | 17,235 | 17,474 | 17,713 | 17,953 | 18,192 | 18,431 | 18,671 | 18,910 |
| 80 | 19,150 | 19,389 | 19,628 | 19,868 | 20,107 | 20,346 | 20,586 | 20,825 | 21,064 | 21,304 |
| 90 | 21,543 | 21,783 | 22,022 | 22,261 | 22,501 | 22,740 | 22,979 | 23,219 | 23,458 | 23,698 |

TABLE V. CUBIC FEET PER MINUTE AND FLUID TONS PER 24 HOURS

| Cu.Ft. per Min. | 0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.0 | 4.5 | 9.0 | 13.5 | 18.0 | 22.5 | 27.0 | 31.5 | 36.0 | 40.5 |
| 1 | 45.0 | 49.5 | 54.0 | 58.5 | 63.0 | 67.5 | 72.0 | 76.5 | 81.0 | 85.5 |
| 2 | 90.0 | 94.5 | 99.0 | 103.5 | 108.0 | 112.5 | 117.0 | 121.5 | 126.0 | 130.5 |
| 3 | 135.0 | 139.5 | 144.0 | 148.5 | 153.0 | 157.5 | 162.0 | 166.5 | 171.0 | 175.5 |
| 4 | 180.0 | 184.5 | 189.0 | 193.5 | 198.0 | 202.5 | 207.0 | 211.5 | 216.0 | 220.5 |
| 5 | 225.0 | 229.5 | 234.0 | 238.5 | 243.0 | 247.5 | 252.0 | 256.5 | 261.0 | 265.5 |
| 6 | 270.0 | 274.5 | 279.0 | 283.5 | 288.0 | 292.5 | 297.0 | 301.5 | 306.0 | 310.5 |
| 7 | 315.0 | 319.5 | 324.0 | 328.5 | 333.0 | 337.5 | 342.0 | 346.5 | 351.0 | 355.5 |
| 8 | 360.0 | 364.5 | 369.0 | 373.5 | 378.0 | 382.5 | 387.0 | 391.5 | 396.0 | 400.5 |
| 9 | 405.0 | 409.5 | 414.0 | 418.5 | 423.0 | 427.5 | 432.0 | 436.5 | 441.0 | 445.5 |

the short ton of 2000 lb. Under such conditions, the estimation of ore by weight and water or solvent by volume leads to confusion, and makes calculation unavoidable before a statement of ratio of dilution or metal content per ton is available.

The weights and volumes as applied to water in the metric system are practically interchangeable, and 1 gm. of pure water occupies 1 c.c. at a temperature of 4° C., at a pressure of 760 mm. of mercury. No such convenient relation exists in the other standard systems. The imperial gallon of water weighs 10 lb. avoirdupois, at a temperature of 62° F. and a pressure of 30 in. of mercury, and occupies a space of 277.41 cu.in. This is found a convenient unit for recording either volume or weight. The U. S. gallon occupies a space of 231 cu.in., and so the weight of a number of them cannot be estimated without calculation.

The final abolition of the gallon as a unit of measurement in hydraulics as well as metallurgy is to be desired. It is an absurdly small unit anyway, and its use often leads to confusion between the U. S. gallon and the imperial gallon. There can be little question as to its inadequacy in many phases of industry. Engineers on both sides of the international boundary are agreed as to the suitability of the fluid ton as a unit in connection with the measurement of water and solution in wet chemico-metallurgical operations. Let them also agree as to the advisability of abolishing the gallon as a recognized unit in other phases of engineering effort.

### Definition of a Fluid Ton

The fluid ton is neither a unit of weight nor a unit of volume. Both factors must be taken into consideration. A uniform weight for the water or solution—62.5 lb. per cu.ft.—is assumed; and, on this basis, the fluid ton is calculated according to volume measurement. A definition in substantial agreement with that given by W. J. Sharwood[1] would be:

*Fluid ton:* Thirty-two cubic feet. A unit to correspond with the short ton of 2000 lb., and of sufficient accuracy for many hydrometallurgical, hydraulic and other industrial purposes, according to which it is assumed that the water or other liquid under consideration weighs 62.5 lb. per cubic foot.

With regard to the strict record of actual weight, the fluid ton, as defined, will coincide with the short ton of 2000 lb. only at a fixed temperature and pressure. One cubic foot of water at 4° C. and atmosphere pressure weighs 62.428 lb., so that there would always be a slight error on this account. This, however, is insufficient to detract, to appreciable extent, from the value of the new unit, which is meant to be used only where extreme accuracy would be meticulous and unnecessary, and where large volumes of liquid are under consideration.

### Use of the Fluid Ton in Mill Planning

Engineers engaged in design work on hydrometallurgical plants usually make the preliminary estimates for storage capacity and conveyance needs on the basis of dilution and general requirements. That is to say, if a 100-ton plant is under consideration, and a 6 to 1 milling dilution is anticipated, this would mean a delivery of 600 tons of water or solution per day at crushing or grinding machine. Pumping and storage capacity is therefore calculated on this basis; and it would certainly be convenient if the fluid ton were more widely used as an alternative capacity unit by manufacturers. Circular-tank capacities are sometimes tabulated in technical books on the fluid-ton basis, but practically all pumping and conveying equipment is standardized according to its capacity in gallons, or cubic feet per hour or minute. The number of gallons that a certain pump can handle every minute is information that has no significance to many engineers. Performances of such machines are usually measured on the 24-hour basis, and the most convenient unit to use for this purpose is the fluid ton.

[1] *Min. Mag.*, Nov., 1918.

## Safety Corner Guard

By L. V. Lauther*

In almost every plant is a corner where accidents frequently occur, regardless of safety signs, mirrors, or lookout windows. Such accidents are usually caused by one man coming into unexpected contact with something being carried by another man who is walking in the opposite direction. An ingenious method of obviating such troubles which is absolutely fool proof,

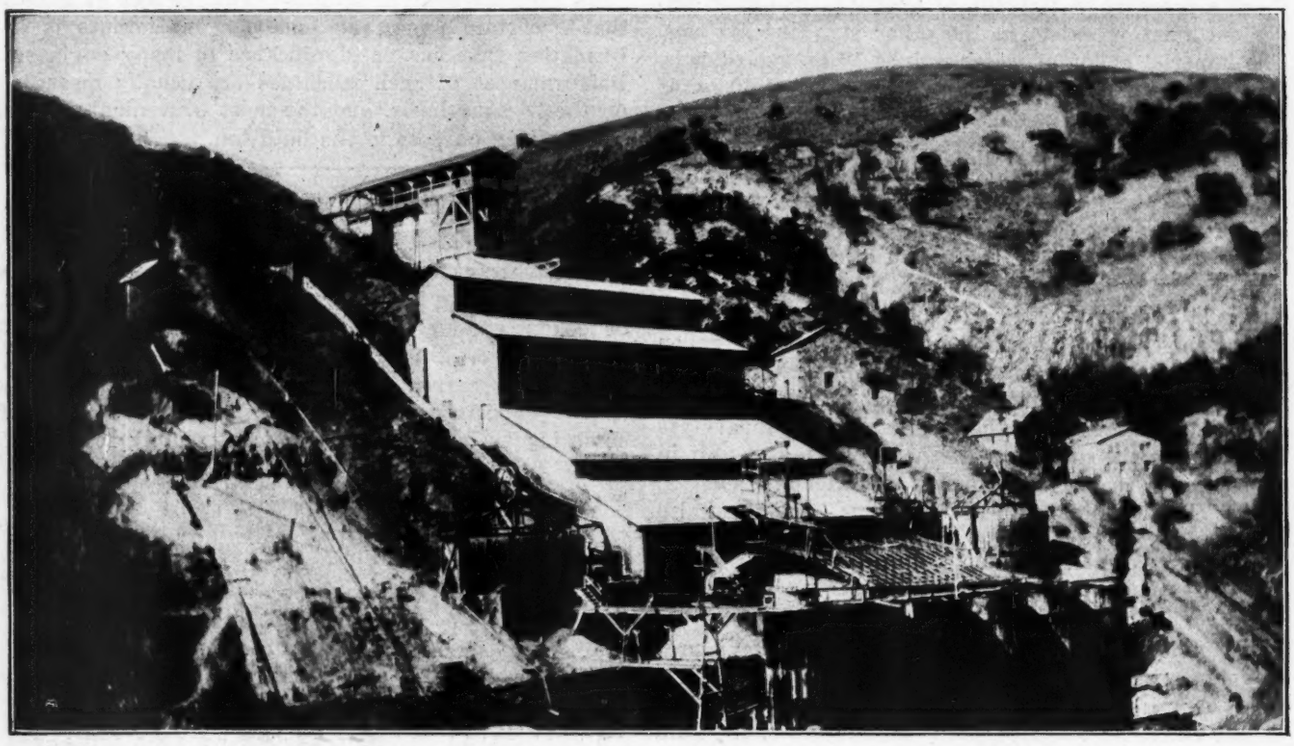
DEVICE TO PREVENT CORNER COLLISIONS

but at the same time so positive in action that, since its adoption, no more so-called corner accidents have happened, is shown in the accompanying cut.

A piece of pipe is bent to the required shape, and the lower end buried or concreted into the ground. The space between this and the corner is covered with coarse wire netting. The device makes it necessary for pedestrians to walk around the projection, and in doing so they are able to see who and what is coming in the opposite direction and take precautions.

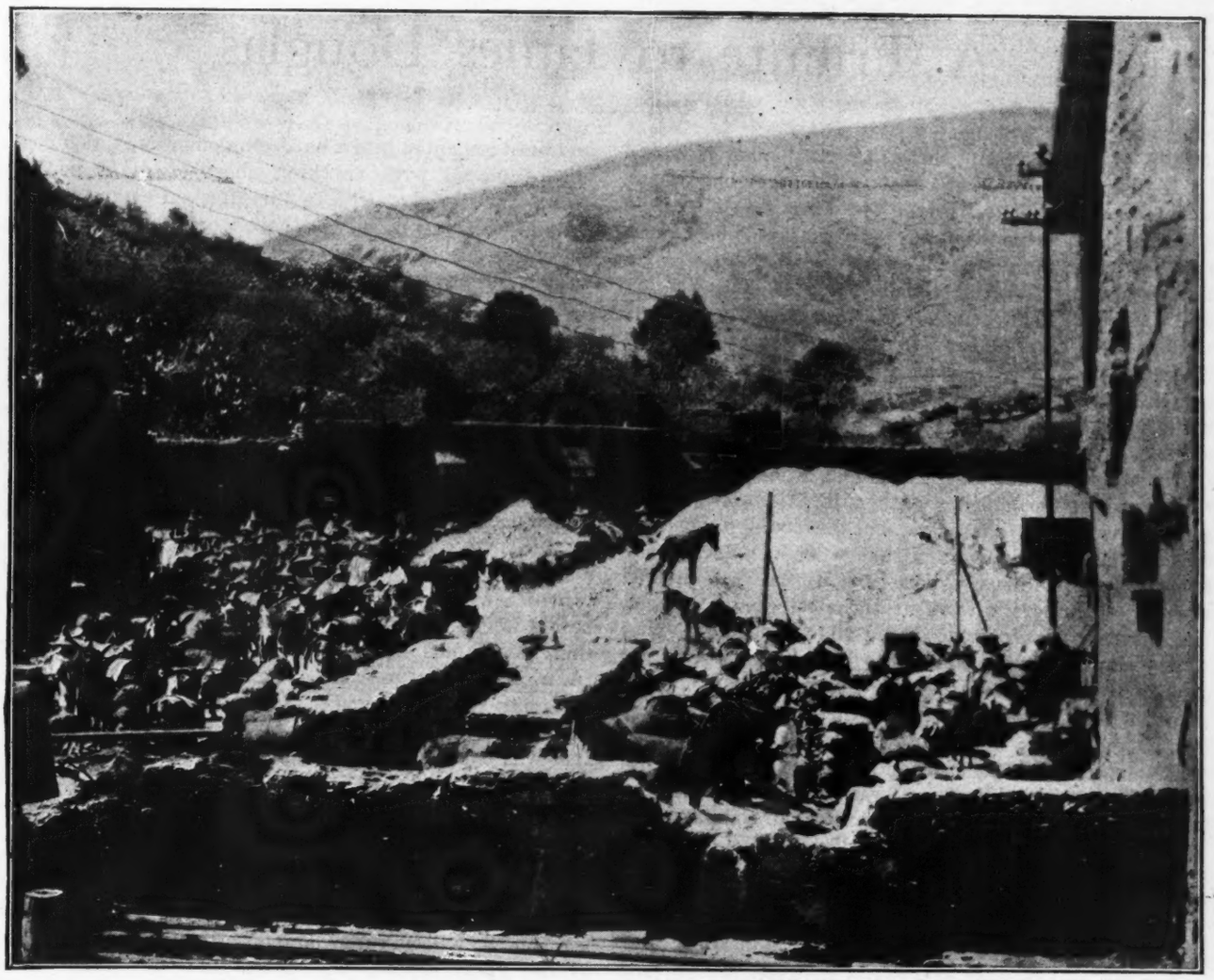
*Manhatten Rubber Manufacturing Co., Passaic, New Jersey.

# Scenes From a Mexican Mining Camp

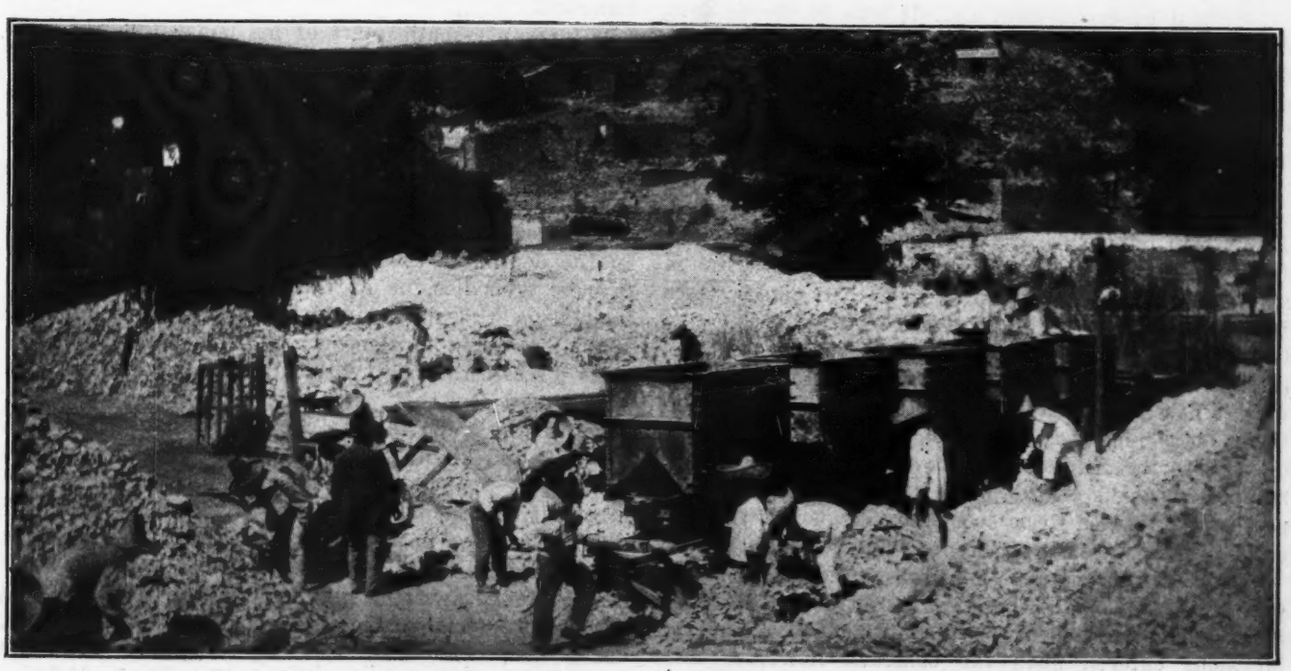


MILL OF THE PROVIDENCIA MINING AND MILLING CO., AT GUANAJUATO, MEXICO

SORTING SILVER ORE AT GUANAJUATO, MEXICO



SHIPPING HIGH-GRADE SILVER ORE, CUBO MINING AND MILLING COMPANY



SORTING, SCREENING, AND TRAMMING SILVER ORE AT GUANAJUATO, MEXICO

# A Tribute to James Douglas

BY JAMES COLQUHOUN

IT WAS as "the professor" that I first knew him, and it is as "the professor" that I, like other old timers, prefer to remember him. He went to Arizona in 1882, I a year later; and there we worked side by side for more than 20 years. I cannot recall the day when first I saw him, but we soon became friends, and we maintained an unbroken friendship to the end.

He was older than I was, and more experienced, yet he never presumed on that account. His views were presented with a modesty which never deserted him, and a moderation which was at once a lesson and an example.

His early training and the personal influence of his noble and self-sacrificing father had left a note of seriousness in his character, but he could unbend on occasion, and could give and take when wit and humor held the field. He never failed, if within reach, to attend my annual dinners, always as the most honored guest. His speeches, reminiscent of old times and old timers, were always instructive and enjoyable; and he was just as eager to listen and as ready to enjoy the flow of humor which is characteristic of the West and of Western men.

His outlook was as wide and as far-reaching as his knowledge, and his knowledge was profound. He spoke well on any subject, and he never failed to command the interest and sympathy of his audience. He had none of the finish and style of the trained orator. In speech he was plain, direct, and unaffected. His strength lay in his good heart, in his sincerity, and in his desire to spread the light of knowledge. Always he pleaded with us for the exchange of experience between the various mines and metallurgical plants. Like the father of us all, as he was in a sense, he passed from one camp to another, a carrier of good will and an example of bright and generous thinking. It was to me he first came with the proposal that our companies should agree to the "side-line boundary." That the agreement was consummated with such happy results to both parties was due as much to the influence of his lofty character as to the soundness of his arguments.

Dr. Douglas was always my guest when he found his way to Clifton, and no guest was more gladly welcomed. In his own inimitable way he made himself one of the family. He loved children, and so young was he in spirit that he would join with them in their games. Once I found him in a deadly football contest with my two little boys. The boys had challenged him, and he had promptly accepted the gage. They selected the parlor for the field of battle, and there, to my dismay, I found them hotly engaged, quite regardless of the consequences to the furniture, windows, and bric-à-brac. I stopped the game on the plea of "rough play," and the professor appeared to be even more disgusted with the decision than were his opponents.

When the Morenci Southern was building, the engineer acting for the company let a contract to the Mormons for the removal of alluvial soil. When the Mormons entered upon the contract, however, they found that for more than a mile this alluvial soil had been cemented into a hard conglomerate, which could not be moved with anything short of giant powder. There was consternation in the Mormon camp, and my friend, President Kimball, their worthy head, came to me and requested that I use my influence to right the wrong. I advised him to go to the professor, but, like others before him, he did not care to "beard the Douglas in his den." I finally consented to write to the professor, and the matter was promptly arranged in the right spirit, much to the relief of the Mormons, the professor remarking, in his dry way, that geology sometimes overshot the mark.

Shortly before the war I met the professor in London. I had not seen him for years, and our meeting was to me a very great pleasure. He was not a day older in spirit. We drove through Walbrook, a narrow lane, and found the way blocked by a beer wagon, anchored to which were two powerful horses. In a moment, and before I could interfere, the professor had the horses by their heads and had led them to a wider space, leaving room for our taxi to pass. The driver came out, wiping the froth from his mouth, and getting ready to swear, but a look at the professor's triumphant and smiling face was enough. No one could swear at the professor.

We agreed to revisit the old scenes in Arizona at some early date in the future, but alas! that pleasure was not to be.

Some one described the professor as the John Bryce of Arizona. I do not agree, although I admit a resemblance. Man of letters the professor undoubtedly was, but he will be remembered not as the historian but as the great captain who more than any other man helped to make Arizona what it is. He had the gift of attracting and holding brainy men, who served him with that splendid loyalty which only the true chieftain can command.

It was an essential part of his policy that the happiest relations should be maintained between the employees and the company. He was one of the first to recognize that the interests of the employee and the interests of the employer are identical, and not in conflict, and through foul and fair weather he adhered to that principle.

He loved the West and he loved the ways of the West. In the depths of the mine, watching the development of new orebodies, or at the metallurgical plant contemplating and discussing the most recent improvements, he was in his element and at his best.

As I recall him now, with all his endearing traits of character, I feel that without him the West will never be quite the same to me. But his spirit—his broad, tolerant, and kindly spirit—will go marching on from generation to generation, making for progress and prosperity; preaching "charity to all and malice to none."

The professor has "gone West"; he has crossed the great divide, and there, let us hope that by God's kindness he found awaiting him some of the boys who had gone before—some of the boys who, true to his teaching, had given proof on the battlefield that there "are some things in this world more precious than life itself."

## Protection Against Reversed Phases

If a three-phase motor is disconnected from a circuit and the phases are reversed, it will, when reconnected, run backward. Such reversal, in general routine operation, aside from the inconvenience it causes, may not be a serious matter, and the error can be corrected at the motor terminals. In other instances, however, serious consequences may result. The reversal of a hoist motor, for instance, might wreck the machinery and cause loss of life.

To protect motors against phase reversal where such protection is necessary, the Westinghouse Electric and

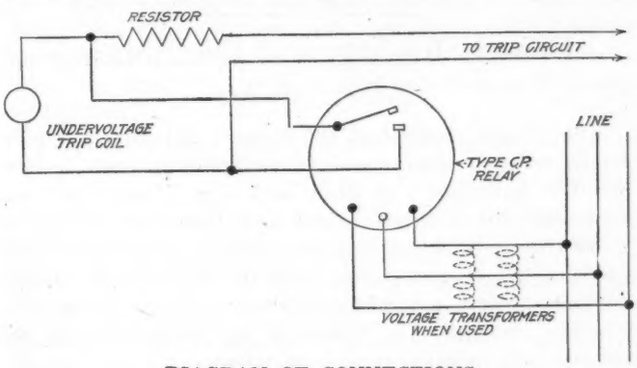



DIAGRAM OF CONNECTIONS

Manufacturing Co. has developed a reverse-phase relay with positive and dependable operating characteristics. If a phase is reversed, if a phase fails, or if the voltage drops below 75% of normal, the relay contacts close and trip the circuit breaker, either through a shunt-trip coil or by short-circuiting an under-voltage trip coil having a series reverse resistor.

The relay operates on the induction principle. When properly connected, the torque holds the contacts open against the restraint of a spiral spring. On low voltage the torque diminishes and the spring closes the contacts. On reversal of the phase connections, the reversed torque assists the spring in closing the contacts.

## Recognition of Technical Engineers

The following letter was recently received by the Engineering Council:

Mr. Alfred D. Flinn, Secretary, December 4, 1918.
Engineering Council,
29 West 39th St.,
New York City.

DEAR SIR:

Referring to your letter of Nov. 20th to the Director General of Railroads calling attention to wages and working conditions of civil, mechanical and electrical engineers of various ranks and their technical assistants:

This matter was taken up with the Director General, and this board has been advised that where such positions as engineers, assistant engineers, draftsmen, and other men of technical training or experience employed on the staff of the chief engineer of the valuation department or the general staff of the mechanical department are not reached by the operation of Supplements Nos. 7 and 8 to General Order No. 27, their cases should receive special treatment at the hands of the Federal managers.

If any of the employees in the service of railroads under Federal control in whom you may be interested feel that the provisions of wage orders affecting their positions are not being properly applied, it is suggested that they take their cases up with the division of labor, in accordance with the provisions of Circular No. 3, copy of which is attached for your information and guidance.

Very truly yours,
*(Signed)* G. H. SINES,
Chairman.

## The Industrial Situation at Essen

The Essen correspondent of the Dutch journal *Yzeren Staal Kroniek* gives an interesting description of the industrial situation in his district on Nov. 17, when the armistice had been signed, which was summarized in the *Ironmonger*. Observant persons, he says, knew that the war industries could not go on much longer, but the people almost to a man were living under a spell, which was suddenly broken when the source of wealth dried up. Then came the cruel disillusion, and it needed a good many days to bring the popular mind back to an understanding of the realities. Three-quarters of our raw material came from Lorraine, which is lost, and we are dependent upon imports to a far greater extent than we were before. On the whole, the revolution took its course quietly, and very little blood was shed. The censorship has to a large extent been abolished, but it is still maintained to prevent evasions of taxes and the transfer by the rich of their capital to foreign countries. Demobilization is proceeding quietly, but in the factories the workmen are demanding and obtaining concessions such as were formerly unheard of. For instance, when a workman has an accusation to bring against a foreman the latter is called upon to justify himself in the presence of the aggrieved man, and if he cannot do so he is reprimanded or dismissed. Many of the foremen have thoroughly deserved this, for during the war workmen were not allowed to leave their places, and there have been many instances of oppression on the part of employers and foremen. The employers in the Ruhr district have now conceded a universal eight-hour day, which has already been put into practice for pitmen, furnace men, and engineers, and will be enforced all round from Dec. 1. On Saturdays the working day ends at 2 p.m. Sunday work, night work, and overtime are to be paid at extra rates.

The sale of iron and steel products for the home market has been freed from control, but all export trade remains state controlled. An extensive program of nationalization is being introduced, under which all wholesale export business, shipping communication with foreign countries, mining, and the iron industry, all factories such as locomotive-building works, which produce mainly for public purposes, and banking are to be taken over by the state. The state will also regulate shipbuilding, divide raw materials among the industries, and introduce a number of new monopolies.

## Alaska Gold Mines Co.

The quarterly report of the Alaska Gold Mines Co., covering the months of July, August, and September, 1918, shows that the mine produced about 2400 tons per working day. The amount of ore milled was 218,930 tons, a decrease of 1018 tons, and caused by shortage of labor. Mill heads showed an average gold value of $1.323, an increase of $0.159 over the previous quarter. The extraction was raised from 81.96% to 82.39%. The net income from yield amounted to $1.09328 per ton, as compared with operating expenses, less miscellaneous income, $1.14802, showing a loss per ton of $0.05474, as compared with $0.04607 during the previous three months.

The mill was operated during the period on an eight-

hour basis, and, together with the power equipment, was maintained in good condition despite the labor shortage. Every possible economy is being practiced, but the company is unable to operate profitably, and there seems to be no prospect of satisfactory financial results so long as present conditions continue.

## Milling in Cyanide Solution*

The outstanding features of milling in cyanide may be summarized as follows:

ADVANTAGES

1. The milling and regrinding plant offers exceptional advantages for the solution of gold and silver by reason of the intimate contact betwen the metal and the solvent.
2. A saving in water consumption may be effected by milling in cyanide when the settlement of the ore is difficult; when the dewatering units are ineffective, or when the residue is being discharged at under 20% moisture.
3. A simplification of plant arrangement is possible and separate return-pumping and storage systems for solution and water are unnecessary.

DISADVANTAGES

1. Decrease in amalgamation efficiency when this recovery method is practiced; corrosion of plates, and increased consumption of mercury.
2. Higher cyanide consumption and longer time that is required to effect a lower extraction of the metal in the ore.
3. Increase in the amount of metal-bearing solution in circuit, with greater liability for mechanical loss, and proportionately higher precipitation costs per ton milled.
4. Liability of neglect in milling and grinding plant operation on account of the poisonous nature of the diluent.

APPLICABILITY

1. When no advantage, either economical, metallurgical, or chemical, arises from the use of a preliminary alkaline treatment of the ore or the water used for milling purposes.
2. When amalgamation, if adopted, would result in an inappreciable saving.
3. When it is not necessary to fine-grind or slime the ore preparatory to cyanidation, thus obtaining a product which, in residue form, usually contains more moisture than if coarser crushing, followed by leaching, had been adopted.
4. When dewatering prior to cyaniding, to within a few percentages of the amount of moisture to be discharged in the residue, is impracticable.

Probably no other chemico-metallurgical process is being operated under so many different conditions as the one dealt with in the article from which this summary has been taken; and for this reason an effort has been made to avoid dogmatic decisions. The conclusions are based on many data and observation of practical operation under a great variety of conditions, with an extensive amount of experimental research, coupled with the available information on the subject.

The necessity for the marshaling of facts and the classification of ideas on this important development is obvious. The subject of milling in cyanide is barely mentioned even in recent textbooks; and the method has often been adopted as a necessary concomitant in the utilization of a specialized process of solution recovery, and sometimes without an apparent realization of the advantages in favor of the alternative method of milling and thickening in alkaline water as a preliminary to cyanide treatment.

*Abstracted from an article by A. W. Allen, in *Chem. & Met. Eng.*, May 15, 1918.

## French Buying and Distributing Associations

The *Journal Officiel* of the French Republic has published a list of the organizations that have been formed for the purchase and distribution in France of raw materials for industrial use. All these organizations, known as groups, committees, offices (comptoirs) and associations (consortiums), are in the form of limited companies with a nominal capital, and are under government control. The following are identified with the mining and metallurgical industries:

Comité des Forges de France, Comptoir de Longwy (Ironmasters' Association).
Comptoir français de ferro-silicium (ferro-silicon).
Comptoir français de ferro-tungstène (ferro-tungsten).
Cie. des forges et aciéries électriques (electric steel makers).
Comptoir d'exportation des products métallurgiques (metallurgical products).
Consortium des marchands de fer (iron merchants).
Société minerais et métaux (ores and metals).
Société aluminium français.
Société le nickel.
Groupement des consommateurs de mineral de manganése.
Comptoir d'achat des tréfileurs de France (wire makers).
Comptoir d'achat des étireurs de France (wire drawers).
Comptoir de répartition des tubes (tubes).
Groupement des étireurs de tubes d'acier (steel tubes).
Comptoir des tubes pour airons (aircraft tubes).
Groupement des importateurs d'amiante (asbestos).

## The German Potash Industry

The manager of the German potash syndicate recently reported that the deliveries in the first eight months of 1918 amounted to 810,000 tons of pure potash, of the value of £10,550,000. It was impossible to give a forecast as to the total turnover for the year, as the deliveries depend upon the condition of the railway transport services, which was excellent to the middle of August. The demand for potash salts by agriculturists continued to be exceptionally large, and, despite all difficulties, producers were able to supply considerably more than the requirements in peace times.

# Industrial News from Washington

BY PAUL WOOTON, SPECIAL CORRESPONDENT

## Revenue Bill Amended

**In the opinion of the majority of the members of the Finance Committee, the Senate has amended the Revenue Bill so as to remove injustices exemplified by the effect the bill, as passed by the House, would have had on such an operation as that of the New Cornelia Copper Co. Gordon R. Campbell, secretary of the Calumet & Arizona Mining Co., sets forth the New Cornelia case in a letter to the Finance Committee, which reads as follows:**

On examination of House Bill 12,863, Report No. 617 of the Committee on Finance, being "An act to provide revenue, and for other purposes," I call your attention to Section 311, covering the war-profits credit.

Section (a) gives to old corporations a credit equal to the average net income of the corporation for the pre-war period. But if the corporation had no income for the pre-war period, this credit is limited by section (b) to 10%, and if it is a new corporation not in existence during the pre-war period it is placed upon the same basis as corporations having pre-war income and is allowed a credit of the same percentage as corporations having pre-war income.

There are many mining companies that were organized long before the pre-war period which had no earnings whatever during the pre-war period, but were prospecting and developing their properties and preparing for the time when there might be some income. Such corporations are placed at an undue disadvantage over old corporations and are not allowed a credit which other corporations in like business are allowed before assessing a war tax.

For a concrete example use our New Cornelia Copper Co., which was organized in 1909 as a successor to several corporations which had been developing a copper property in Arizona prior to that time. The new corporation continued to develop the property from its organization, but had no income during the pre-war period and was not a producer of copper during that period. Later developments both on the property, orebodies, and in the method of treatment of ores since that time have developed a very valuable mine. As a matter of fact, it is the only new producer of copper in the years 1917 and 1918, or during the period since the United States entered the war, to add a considerable tonnage to the supply of copper. It began production on a considerable scale in June, 1917, and since that time has produced about 70,000,000 lb. of copper.

Under Section 311 other copper-producing companies will be allowed from 50 to 200% credit before the war tax can attach; in other words, they will pay an excess-profits tax but no war tax. These companies also had the benefit of the high prices of copper prior to the entrance of the United States into the war and prior to the time when the price of copper was fixed at 23½c. a pound.

This new company has sold all the copper which it produced at the price fixed by the Government, and has no war profits; yet on account of the wording of the act it would seem that it would be compelled to pay a war-profits tax of 80%, and if forced to pay such a tax at the present time, it would be practically thrown into bankruptcy, as its income of the past year has been barely sufficient to pay the debts incurred to enable it to become a producer.

Is there any reason why corporations having no pre-war earnings should not be placed in the same class as corporations not in existence for at least a whole year during the pre-war period?

I suggest the elimination of paragraph (b) of Section 311 and the amendment of paragraph (c) to read substantially as follows:

"If the corporation had no net income for the pre-war period, then the war-profits credit shall be the sum of one and two."

This would place old corporations having no pre-war earnings and new corporations, which, of course, could have no pre-war earnings, in the same class, and place them on an equality with old corporations having pre-war earnings.

I believe that you will see the justice of this and sincerely hope that you will use your best efforts to secure the amendment of the bill accordingly.

I also desire to register a protest against those provisions of the act which extend these taxes through years subsequent to 1918.

**It is believed that the New Cornelia example is typical of many mining operations. As amended by the Senate, Sections 327 and 328 read as follows:**

Sec. 327. That in the following cases the tax shall be determined as provided in Section 328:

(a) Where the commissioner is unable satisfactorily to determine the invested capital as provided in Section 326;

(b) In the case of a foreign corporation;

(c) Where a mixed aggregate of tangible property and intangible property has been paid in for stock or for stock and bonds and the commissioner is unable satisfactorily to determine the respective values of the several classes of property at the time of payment, or to distinguish the classes of property paid in for stocks and for bonds, respectively;

(d) Where, as compared with representative corporations, engaged in a like or similar trade or business, the taxpayer would (under Section 326) be placed in a position of substantial inequality, because of the time or manner of organization, or because the actual value of the assets on Mar. 1, 1913, was substantially in excess of the amount at which such assets would be valued for the purpose of computing invested capital under the provisions of Section 326;

(e) Where the invested capital is materially disproportionate to the net income as compared with representative corporations engaged in a like or similar trade or business because:

1. The capital employed, although a material income-producing factor, is very small or is in large part borrowed;

2. There are excluded from the invested capital as computed under the provisions of Section 326, intangible assets of recognized and substantial value built up or developed by the taxpayer;

3. The net income for the taxable year is abnormally high due to the realization in one year of (a) gains, profits, or income earned or accrued during a period of years or (b) extraordinary gains or profit derived from the sale of property the principal value of which has been demonstrated by prospecting or exploration and discovery work done by the taxpayer. When the tax is determined under this paragraph proper allowance shall be made for the taxes which would have been payable in prior years if the gains, profits, or income earned or accrued in such years had been taxed at the rates then applicable;

4. Proper recognition or allowance can not be made for amortization, obsolescence, or exceptional depletion due to the present war, or to the necessity in connection with the present war of providing plant which will not be wanted for the purpose of the trade or business after the termination of the war.

Sec. 328. (a) In the cases specified in Section 327 the tax shall be the amount which bears the same ratio to the net income of the taxpayer (in excess of the specific exemption of $3000) for the taxable year, as the average tax of representative corporations engaged in a like or similar trade or business, bears to their average net income (in excess of the specific exemption of $3000) for such year. In such cases the commissioner shall compare the taxpayer only with representative corporations whose invested capital can be satisfactorily determined under Section 326 and which are, as nearly as may be, similarly circumstanced with respect to gross income, net income, profits per unit of business transacted and capital employed, the amount and rate of war profits or excess profits, and all other relevant facts and circumstances.

(b) For the purposes of subdivision (a) the ratios between the average tax and the average net income of representative corporations shall be determined by the commissioner in accordance with regulations prescribed by him with the approval of the Secretary.

(c) The commissioner shall keep a record of all cases in which the tax is determined in the manner prescribed in subdivision (a), containing the name and address of each taxpayer, the business in which engaged, the amount of invested capital and net income shown by the return, and the amount of invested capital as determined under such section. The commissioner shall furnish a copy of such record and other detailed information with respect to such cases when required by resolution of either House of Congress, without regard to the restrictions contained in Section 257.

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**Repeal of the arsenic rules and regulations has been announced by the division of collateral commodities of the U. S. Food Administration.**

## Tin Export Restrictions Removed

The War Trade Board announced on Dec. 23 that restrictions on the exportation of tin and tin plate had been removed, as the necessity for strict conservation of tin and its products no longer existed. Applicants were told that if they would refile applications for which licenses had been refused, these would be given immediate consideration.

## Industrial Situation in Belgium

H. C. Hoover has just completed a survey of the entire Belgian situation as disclosed by the evacuation, and has made the following report:

Prior to the armistice the German army had completely destroyed a zone of railroads and canals some 20 miles wide, extending across Belgium. After the armistice there was comparatively little destruction of transportation to the rear of this zone, and with the rapid rehabilitation of transportation facilities across this zone of destruction the problem of distribution of food and of reconstruction can be undertaken with much less difficulty than at present.

The Germans in their final retreat removed but little of the relief supplies. Their action toward the native harvests and cattle in their withdrawal differs widely in different areas. They started to take all remaining hogs from the western part of Belgium, except those hidden by the peasants in underground caves. After the armistice, however, and with the demoralization of the German army in its final retreat, many of these beasts were abandoned or sold by soldiers to the peasants further back, and in practical results there appears to have been no widespread cattle stealing in the retreat, although during the four years of occupation there has been a great diminution—probably more than one-half—in the total number of cattle and hogs. It can be said almost literally that horses have disappeared out of Belgium, there probably not being 15% of the original animals left.

Investigation proves that industrial and residential destruction in Belgium varies greatly in different localities, and with different industries. For instance, out of the steel furnaces in Belgium 35 or 40 have been deliberately destroyed by the Germans in their determination to end the Belgian steel industry. Many of the textile mills have been put out of commission, either through deliberate destruction and removal of machinery, or by removal of the copper and brass parts and electric motors. Some of the textile mills of the more antiquated type of equipment apparently did not appeal to the Germans, and they can be gotten into action at an early date. The Germans seem to have focused themselves on the modern equipments.

The glass industry has been but little interfered with, and the stern promise of retribution by President Wilson seems to have saved the coal industry except for very few mines, although actual explosives and wires were laid in place for the destruction of a large number of mines. The President's warning seems to have created a sudden change of heart.

## New Research Bill Drafted

WASHINGTON CORRESPONDENCE

A substitute for the Smith-Howard Bill has been prepared by the National Research Council. The intent of the substitute bill is the same as that of the Smith-Howard measure, namely, "To establish engineering experiment stations in the states, territories, and the District of Columbia in connection with state-supported universities or engineering schools for the promotion of engineering and industrial research as a measure of industrial, military, and naval preparedness in times of peace or war."

From such discussion as has been had, it is apparent that a bill giving the central powers to the National Research Council would receive the support of most of those interested. The National Research Council's substitute recognizes Federal aid as desirable to scientific and industrial research. It provides for state scientific commissions appointed by the respective governors. The commission is to be composed of at least five eminent scientific men. They are to serve without salary. They shall designate the institutions which are to participate in the fund. These commissions each year are to pass on the applications for aid and are to prepare a budget covering the cost of approved research.

In Washington most interested persons believe that Government bureau initiation and control of research is not desirable. The author of the Smith-Howard Bill is Phineas V. Stephens, of New York. K. G. Matheson, president of the Georgia School of Technology, is understood to have coöperated closely in the matter.

## Explosives Handled Carelessly

WASHINGTON CORRESPONDENCE

Supervision of the handling, care, and storage of explosives during the war has revealed that there is widespread disregard for safety in handling of these materials. As a result, the U. S. Bureau of Mines, in withdrawing its estimate for explosives work, which was made before the armistice, has let it be known that another estimate will be substituted, so as to permit of a Federal inspection service, to be conducted in coöperation with the state services.

Experiments are already in progress at the Bureau's laboratories in an attempt to evolve the best methods for converting military explosives into explosives which can be used in works of peace. Means already have been devised whereby T.N.T. can be used in making the flameless explosive adapted to use in coal mines.

The cessation of munitions shipments found 55,000,000 lb. of T.N.T. in the Government's hands. It is believed that this material will stand storage for 15 years. Permanent storage is available, however, for only 38,000,000 lb. It is believed that the remainder can be converted into forms which will permit its prompt use in public works and other Government activities.

Permission has been granted by the Interstate Commerce Commission to the Long Island R.R. to establish rates dependent upon the value of the following commodities, refined in transit at Laurel Hill, N. Y.: Copper anodes, bars, bullion, cakes, cathodes, ingots, matte, ore, slabs, and lead bullion.

**Denain & Anzin Steel Works, France**—The *Ironmonger* gives some details of the destruction of the steelworks of the Denain & Anzin company, at Denain, by the Germans, which shows how they did their dirty work. It appears that the plant was closed for want of material and labor on Sept. 15, 1914, soon after the Germans entered the place. The manager was repeatedly requested to reopen it for the manufacture of German war material, but he refused, and toward the end of the year the Germans sent down Captain Bocking, a prominent German ironmaster, to take possession. After making an inventory, Bocking called in German workmen, assisted by 3000 Russian prisoners, and proceeded to strip the place, all the plant being sent to German competitors of the company, whose addresses are known. After this another German called Dreyer, who before the war had been employed by the French Homécourt steel works, was sent to pull down the principal buildings, the remainder being blown up, with the exception of a few sheds which were used as warehouses by the Germans until they were ejected from Denain, when they set them on fire.

## Braden Men Aid Comfort Fund

Again it is possible to announce the receipt of a generous contribution to the 27th Engineers' Comfort Fund from South America. The staff at El Teniente mine of the Braden Copper Co. had the mining regiment on its Christmas list, and, just before the holiday, wired the fund the sum of $450 with the best Christmas wishes of the donors. The latter were: James Chambers, E. J. Craig, R. E. Douglass, Alma Ek, Horace R. Graham, L. E. Grant, H. W. Jones, A. J. Noerager, J. F. Pearce and W. W. Stevens. Men at the company's plant contributed $21 more. Thus the Comfort Fund is carried well along toward its goal of $20,000.

HOW THE COMFORT FUND STANDS

| | |
|---|---|
| Previously acknowledged | $18,492.77 |
| C. M. Eye | 10.00 |
| C. A. Burdick | 5.00 |
| Mining and Metals Section, National Safety Council | 125.00 |
| John Herman | 10.00 |
| Lane Pearl | 5.00 |
| W. L. Gibson | 5.00 |
| C. M. Fenton | 10.00 |
| Charles Le Vasseur (monthly) | 5.00 |
| B. N. Jackson | 10.00 |
| H. A. Johann | 10.00 |
| Mrs. A. B. Emery, Messina, Transvaal | 10.50 |
| A. C. Stoddard | 5.00 |
| Robert E. Tally | 25.00 |
| Nelson P. Hulst | 20.00 |
| Lawrence Addicks | 20.00 |
| B. R. Boyd | 25.00 |
| E. R. Varela | 5.00 |
| W. J. Olcott | 25.00 |
| J. E. Clennell | 10.00 |
| C. M. Eye (monthly) | 10.00 |
| A. H. Hoffman | 10.00 |
| Francis Drake | 25.00 |
| Employees of Sociedad Minera Backus y Johnston del Peru | 176.29 |
| Charles Le Vasseur (monthly) | 5.00 |
| E. Wartenweiler | 10.00 |
| Walter Douglas | 100.00 |
| Robert E. Dye | 10.00 |
| R. T. Hancock | 2.00 |
| El Teniente Staff, Braden Copper Co | 450.00 |
| Employees, Braden Copper Co.'s plant | 21.00 |
| Total | $19,653.56 |

Friends are urged to help the Comfort Fund make a strong finish. All checks should be made payable to W. R. Ingalls, treasurer of the Association of the 27th Engineers.

## Priority List of Engineer Units

The War Department has announced that the following engineer units have been placed on the priority list for orders to return to this country:

The 40th Engineers, placed on priority Dec. 4, 33 officers, 623 men; 109th Engineers, sappers, placed on priority Nov. 26; 311th Engineers and engineer train, placed on priority Nov. 29, 57 officers, 1685 men; 312th Engineers, placed on priority Nov. 26; Headquarters, 24 officers and 29 men; Headquarters Co., 2 officers and 156 men; Co. A, 3 officers and 224 men; Co. B, 5 officers and 221 men; Co. C, 5 officers and 217 men; Headquarters detachment, 1 officer and 3 men; Co. 1, 4 officers and 245 men; Co. E, 6 officers and 237 men; Co. F, 5 officers and 241 men; 312th Engineers, 2 officers and 74 men; 319th Engineers and train, placed on priority Dec. 4, 4 officers and 217 men; Co. E, 4 officers and 222 men; Engineer casual Co. No. 1, placed on priority Dec. 4, 2 officers and 223 men; 2nd Engineers, placed on priority Dec. 6, Co.'s F, I, K, and medical detachment, 7 officers and 760 men; Co.'s D, E, G, and H, 35 officers and 1000 men; 26th Engineers, placed on priority Dec. 17; Co. A, 8 officers and 253 men; Co. B, 2 officers and 231 men; 27th Engineers, placed on priority Dec. 16, 46 officers and 1400 men; 29th Engineers, placed on priority Dec. 12; Headquarters and detachment, 2 officers and 8 men; Co. B, 14 officers and 238 men; Co. C, 11 officers and 185 men; Co. B, 8 officers and 83 men; Co. E, 14 officers and 119 men; Attached, 3 officers and 18 men; Co. F and detachment, 24 officers and 408 men; Engineer casual Co No. 1, placed on priority Dec. 4, 2 officers and 223 men; 317th Engineers, placed on priority Dec. 4, cancelled Dec. 16.

It was stated that the units generally arrive in this country from four to six weeks after being placed on priority list.

## December Mining Dividends

December dividends by 39 United States mining and metallurgical companies totalled 20,709,125, as compared with disbursements of $29,004,548 by 43 companies in December, 1917. The Yukon Alaska Trust made its usual quarterly payment of $203,433. Canadian and South American companies paid $2,144,040 in 1918 and $1,530,734 in December, 1917.

| United States Mining and Metallurgical Companies | Situation | Per Share | Total |
|---|---|---|---|
| Ahmeek, c | Mich. | $2.00 | 400,000 |
| Allouez, c | Mich. | 1.50 | 150,000 |
| Am. Sm. and Ref., com | U. S.-Mex. | 1.50 | 914,970 |
| Am. Sm. and Ref., pfd | U. S.-Mex. | 1.75 | 875,000 |
| Argonaut, g | Calif. | .05 | 10,000 |
| Atolia, tung | Calif. | .50 | 50,000 |
| Bingham Mines, c | Utah | .50 | (a) 75,000 |
| Caledonia, l.s | Ida. | .03 | 78,150 |
| Calumet & Ariz., c | Ariz. | 2.00 | 1,284,960 |
| Calumet & Hecla, c | Mich. | 15.00 | 1,500,000 |
| Centennial, c | Mich. | 1.00 | 90,000 |
| Chino, c | N. M. | 1.00 | 869,980 |
| Columbus-Rexall | Utah | .02½ | 14,659 |
| Cresson Cons., g | Colo. | .10 | 122,000 |
| Cons. Ariz. Sm., c | Ariz. | .05 | 83,150 |
| Copper Range, c | Mich. | 1.50 | 591,598 |
| Davis Daly, c | Mont. | .25 | 150,000 |
| East Butte, c | Mont. | 1.50 | 631,097 |
| Federal Min & Sm., pfd | U. S. | 1.75 | 209,757 |
| Golden Cycle, g | Colo. | .03 | 45,000 |
| Grand Central | Utah | .03 | 18,000 |
| Hecla, l.s | Ida. | .15 | 150,000 |
| Homestake, g | S. D. | .50 | 125,580 |
| Horn Silver, s.l.z.c | Utah | .05 | 20,000 |
| Internat. Nickel | U. S.-Can. | 1.00 | 1,673,384 |
| Iron Cap, c | Ariz. | .25 | 36,225 |
| Isle Royale, c | Mich. | .50 | 75,000 |
| Kennecott, c | .... | 1.00 | 2,786,953 |
| Nevada Con., c | Nev. | .75 | 1,499,593 |
| Old Dominion, c | Ariz. | 1.00 | 297,071 |
| Osceola, c | Mich. | 2.00 | 192,300 |
| Quincy, c | Mich. | 2.00 | 220,000 |
| Ray Con., c | Ariz. | .75 | 1,182,384 |
| St. Joseph Lead | Mo. | .50 | 704,733 |
| Tom Reed, g | Ariz. | .02 | 18,191 |
| United Eastern, g | Ariz. | .07 | 95,410 |
| Utah Con., c | Utah | .25 | 75,000 |
| Utah Copper | Utah | 2.00 | 3,248,980 |
| Western Dev., l.s | Colo. | .50 | 25,000 |
| Yellow Pine, l.s.z | Nev. | .12 | 120,000 |

(a) Payable in 4¼% Liberty Bonds.

| Canadian, South American Companies | Situation | Per Share | Total |
|---|---|---|---|
| Cerro de Pasco, c | So. Am. | $1.25 | 1,122,780 |
| Hedley, g | B. C. | .15 | 18,000 |
| Hollinger, g | Ont. | .10 | 492,000 |
| Kerr Lake, s | Ont. | .25 | 150,000 |
| Lake Shore Mines, s.g | Ont. | .02½ | 50,000 |
| Min. Corpn. of Can., s | Ont. | .18¾ | 311,260 |

The total paid by United States mining and metallurgical companies in 1918 was $165,134,997; by Canadian, Mexican, Central and South American mines, $23,548,294; and by holding companies, $2,101,871.

A full review of the year's dividends will appear later. As this will be made up from revised returns, there will be some changes in the totals as here given.

## Germany's Industrial Future

Dr. Walter Rathenau, head of the German General Electric Co., one of the largest employers of labor in Germany, recently said:

"Germany is ruined for generations to come. It is the greatest calamity that has happened in any country for 2000 years. We are ruined politically, industrially, and economically.

"All our people here do not yet know the truth. I told the German people that they would lose the war, but everybody scoffed at me.

"We have a population of nearly 70,000,000. Half of them can live on what grows on our soil or is found below it. The other half live on the industries for which all materials have to be bought and paid for by what they sell.

"Now our colonies are going; and Alsace-Lorraine,

DINNER OF THE ROCKY MOUNTAIN CLUB TO SOLDIERS AND SAILORS AT THE HOTEL ASTOR, CHRISTMAS, 1918

too, with all the ores and the greater part of the potash production. There is danger of losing other parts of our country, the Danish and so-called Polish districts, which in reality are German.

"Then comes the question of indemnities. If the indemnities are high, the interest and repayments will take our savings, and we shall have nothing with which to expand our industries. Black ruin will face us, and there will be a great tide of emigration, probably to South America and the Far East and certainly to Russia. It will be most dreadful, and the result will be the Balkanization of Europe.

"The disappearance of Germany from a position of importance will be the most dangerous fact in history. Sooner or later the Eastern powers will press on the Western civilization.

"Germany has been hungry for three years, but it is not yet starving. Everybody who sees Germany will say that she is not starving now, and that is perfectly true. But if you talk of provisions to be found in Germany, you must say truthfully that they will be exhausted in two months; and if you wait until then to send food, it will be too late, because 70,000,000 people cannot be fed as easily as, say, 7,000,000 Belgians. Ships are the greatest factor in feeding Germany."

Dr. Rathenau said that he had seen the damage done in Belgium and Northern France, and his estimate of the indemnity payable for this was £1,000,000,000. That sum would, if anything, be excessive.

## The Rocky Mountain Club's Dinner*

Two hundred convalescent wounded soldiers will start back into the West today, whence they came something like a year or more ago to demonstrate in France what an easy job it would be for a Pacific Coast or Rocky Mountain type of scrapper to finish off the world war and get the boys out of the trenches for Christmas. Up to yesterday each of the men with a wound stripe thought the war and his experience quite the dominant thing, and there was many a thrilling story all ready to take the lead in the first conversation back home.

The war won't figure so prominently now, for the wounded 200—and several hundreds of other soldiers and sailors—dropped in at the Astor Hotel yesterday and met the members of the Rocky Mountain Club, men who all have a reputation for having done big things out in that part of the country from which the Sunset Division came.

### Fed 800 Soldiers Last Year

So when the division came East on its way to France last year, the Rocky Mountain Club members took them in hand on Christmas Day and filled them up with turkey and the kind of real Christmas cheer they would have had back home. The Rocky Mountaineers called it the Partition of Turkey at Yuletide, and the 800 of the Sunset Division men and the club members present promised there would be a Christmas feast for Western men in olive drab every Christmas while the war was on.

Yesterday's dinner was larger in attendance by a thumping half. The club had announced that a thousand would be there. The *Sun* man carefully estimated between 1200 and 1300, and you would have needed a shoehorn to admit another man. Five hundred in khaki had been invited through Secretary Baker. Three hundred and fifty gobs had received their bids by way of Secretary Daniels. British Consul-General Bayley, who sat at the table of honor and made a speech, had collected, by request, about 150 Canadians and Australians around town. From the "Marseillaise" lying in the harbor came two tables of French bluejackets.

"This isn't enough," thundered John C. Montgomery, master of ceremonies, to his aids. "Go on out and round up some more." So they went out and they rounded up more, and if anybody rounded up made a fight to stay away, nobody heard about it.

They had oysters and turkey and all that, as much of it as they could eat. They were entertained with a cabaret procured from two or three theatres. The cabaret held forth from the dais at the end of the grand ballroom, but now and then trickled down among the tables.

The toasts were in bottled sweet cider, with a wicked hint on the souvenir menu that the club was doing its best for good cheer, but the boys probably would have to wait till they got home to some dry state in the West, like Montana. The club president, John Hays Hammond, had sent an appropriate greeting to the guests. It was printed in the menu leaflet, along with this poem from Mountaineer Senator Bert M. Fernald, of Maine. He wrote it, too:

Soldiers all, a royal welcome
To the land you love so well;
You have captured Bill the Kaiser,
You have licked his Huns like Hell!
We're indebted for your valor,
For the bravery you have shown,
You have fought a hero's battle,
You shall wear a hero's crown.
Saddened memories will linger
Of those fallen in the fray,
Happy, cordial, Christmas Greetings
To you from old U. S. A.

Hail, O hail, ye valiant Sailors!
Following Uncle Sam's advice
You have whipped the German Army,
Put old Kaiser Bill on ice.
All the nation joins in welcome,
All the people now are glad,
We'll remember in the future
Every husky Sailor lad.

Secretary Baker had delegated his task of providing some guests to General Somebody, who has passed it along to Colonel Somebody Else, and so on till they put it up to Capt. R. A. Flood, at Camp Merritt, and he brought in 200 convalescent wounded from overseas, on condition that he could have 'em back to entrain for the camp at 8:30 and for their homes in the West tomorrow morning. So, after dinner the U. S. S. "Columbia's" jazz band officiated, and the cabaret furnished dancing partners to while away the afternoon.

The gobs and their officers present were from the transport and cruiser service, from the destroyers, and from the "George Washington" and the "Manchuria" in particular.

The Governors of all the Rocky Mountain states are men of might in the club. They all sent messages, and most of them added contributions, just to be sure the turkey went around.

*From the New York Sun, Dec. 26, 1918.

# Editorials

## Differences in Economic Opinion

STUDENTS of economics and finance cannot fail to have noticed the fundamental differences in opinions that are expressed by the two great financial organizations of New York—the National City Bank and the Guaranty Trust Co. The former has steadily, during the period of the war, warned against the danger of inflation and has consistently advised measures to avert it. The Guaranty Trust Co., on the other hand, has denied that there has been any inflation and has rather implied that it would not have been a bad thing if there had been a little.

These different views revert to a fundamental difference in economic doctrines respecting money. Mr. Vanderlip holds firmly to the quantitative theory of money. Owing to what follows from that theory and what he considers to be the recent, and still existing, state of inflation, he is of the opinion that readjustment in prices will be delayed and that a high range of prices is to be expected for a long time to come. Indeed, in a recent address he expressed himself very optimistically in this respect.

Mr. Sabin, on the other hand, views "the critical transition period now upon us" with grave concern, and considers that "we face the problem of adjusting a tremendously stimulated production to a decreasing market, and must not forget that if we are to compete successfully with the rest of the world we cannot load our production with excessive costs."

Both of these great financial organizations issue periodical publications to which their officers, economists and statisticians contribute. The difference in the thought that has been running through the respective publications for a long time has been both interesting and stimulating. Even so abstruse a subject as the quantitative theory of money has its practical bearings. In fact, the practical bearings are manifold and of fundamental importance in determining the financial policies and the welfare of nations.

## *La Ingenieria Internacional*

REALIZING the value of the international exchange of ideas on things engineering, the McGraw-Hill Co. on Mar. 1 will begin publication of a magazine dedicated to that purpose. While eventually it is expected to appear in editions in several languages, the original issue will be in Spanish, under the name *La Ingenieria Internacional*, and to serve Latin-America and Spain.

The purpose of the new magazine, which has been under consideration for some years, is to afford a medium for the presentation of those developments in American engineering which may be of value to engineers, contractors, and manufacturers in other lands. At the same time, following the practice of the present McGraw-Hill publications, a far-flung editorial organization will be developed, so that there will be drawn into the paper the best of engineering practice in Latin-America, Spain, and other Spanish-speaking countries. Aside from this function, the new magazine will be an important developer of international good will, and at the same time a medium by which American manufacturers engaging in export trade can carry their message to prospective buyers in foreign lands.

It may be a cause of surprise that the McGraw-Hill Co., whose specialized papers circulate so widely overseas, should establish a magazine to serve the foreign field. The reason, however, is not hard to find. The present highly specialized papers appeal only to those who are situated where engineering enterprise has made such progress that there is room for the specialist and need for the best refinement in equipment and design. But everywhere the world over are territories newly developing, where the engineer, the contractor, and the manufacturer must turn his hand to many lines. It is to serve the general practitioner so situated that the new magazine, and its later companions in other languages, will be started. The specialized papers in English will still hold their place as the recorders of the best in the advanced practice of American engineering.

## Work of the Bureau of Mines

A SUMMARY of the work of the Bureau of Mines was given in the *Journal* of Dec. 21, as taken from the director's report for the year ended June 30, 1918. This report, although quite voluminous, is quite disappointing, in that it does not tell what was really accomplished during the year. As explained by the director, by far the larger fraction of the Bureau's work was done for or in connection with various departments, war boards, and war activities, and at the time of editing it was naturally inexpedient to state publicly its accomplishments in detail.

Perhaps the most useful work accomplished was that of assisting the Army in equipping itself with means to withstand gas attacks and in the development of means for offensive gas and fume attacks, all of which the Bureau was in a position to do because of the large staff of employees who had been studying ways and means of preserving life in the presence of toxic gases. If the Bureau had had no other accomplishments to its credit during the year, this alone would have been ample reason for its existence.

The various publications of the year covered a wide range of usefulness, and much was accomplished that it would be impossible or impracticable for private industry to have attempted. The work planned and started, though yet unfinished, covers even a wider field, and it is questionable if the Bureau is not beginning to do or trying to do some of these things that had better be left to private endeavor. We refer particularly to milling and metallurgical problems respecting the

common or much-used metals. So much of this work has been undertaken, and so few results have been published, that it may not yet be time to criticise this work either favorably or unfavorably, and yet we cannot help but feel that special problems which have already been attacked by private individuals or companies should not in general be taken up by the Bureau. When the Bureau can only follow, summarizing or confirming the work of others in the development of purely commercial processes, we believe that it goes outside of the useful field. Where it can lead the way, by investigating or developing methods that are beyond the means of private capital, or methods that have no immediate commercial value but may be of value in years to come, these certainly constitute a proper field for its activities.

Concentration and the metallurgy of the common metals are subjects that should be left largely to the private practitioner. The recovery and use of the rare or uncommon metals, as, for example, radium, might well be taken up by the Bureau. In this we do not mean to criticise the Bureau for what it has done, but rather to criticise the judgment of those who authorized and instructed the Bureau to conduct specific experiments that should have been left to the laboratories of private engineers and should have been paid for by those who were to benefit, and not by the Government. It is quite proper for the State of Minnesota to establish an experimental station for the study of iron ores. That state is the owner of large tracts of uncommercial iron ore and is financially and directly interested in converting those ores into a commercial product. It does not follow, however, that our Government should spend the public moneys in developing the private resources of the State of Minnesota or those lands held privately. There may be need of a public testing plant in Minnesota, but for the present private endeavor is quite capable of placing on the market a very large amount of ore at reasonable figures, and the public is not suffering from a lack of iron ore that any effort of the Government can relieve.

We are only too happy to credit the Bureau of Mines with all of the splendid work that it has done, but in giving that praise we do not wish the Bureau to think that we have no real criticism to offer of what it has not accomplished.

We cannot help but feel that a part of the present unfortunate manganese - chromium - sulphur situation should have been foreseen and to a certain extent forestalled by the Bureau. In his report the director states specifically that the sources for the production of these substances had been most thoroughly examined before June 30, 1918, by which time the war demands were also fully known. If the Bureau had all of this information, some one is certainly to blame for not having made it public, for not having taken precautions against overproduction of an unmarketable material—for not having prepared to handle the situation on the suspension of hostilities.

We hope that the Bureau did pass its information on to less capable but more authoritative powers. It and the Survey are nevertheless receiving a great portion of the blame from those who have stocks of unsalable ore on hand, from men who were urged by "Government representatives" to get out every pound of ore that they could. In the days not far ahead, when appropriations are being asked for, some miners are going to remember that they were "stung" through the representatives of the Interior Department, whether that memory is deserved or not.

We trust that in the near future the Bureau may find it opportune to publish what it really did do in the great war work—what information it gathered and distributed. It may be late for general public utility, but we believe it will appear greatly to the credit of the Bureau.

## No Work, No Food and No Fuel

IT WAS a foreign diplomat who aptly characterized the Bolshevik principles as "high wages for no work, the taking of others' property without punishment, and no taxation."

But the above principles, simple as they appear, have not been found to work satisfactorily in practice. The Russian workmen, who have tried them, complain that although everything now belongs to them, they are unable to get a living.

They have robbed the thrifty and well-to-do and have turned them out of their dwellings. But the workmen—or should we say the ex-workmen—do not find it so satisfactory to occupy a palace while starving and freezing as they did when they lived in huts and tenements and had enough to eat and keep reasonably warm.

## Standardized Methods

THE *Journal* has been particularly fortunate in securing the series of articles, "Standardization of Mining Methods," by Charles A. Mitke, of the Phelps Dodge Corporation. Though this title may be somewhat formal, suggesting that the papers are written for the eyes of managers and efficiency engineers, only, readers will soon find that Mr. Mitke has merely stated the proper way of doing things around a mine, in language that may be understood by every one on the property, from mucker to manager, and, if there is a proper way, it may be appropriately called the standard method for that mine.

The aim of the technical press is, naturally, the dissemination of technical information, which includes details concerning the right way of doing things, both great and small, and the larger the number of readers that may be reached, the more useful the publication. Bearing this in mind, it has been the hope of the *Journal* that it might reach not only the manager and superintendent, but that it might be as useful to the foreman, the shift boss, and the laborer.

In the present day of high costs, it is the duty of every man on the job to do his utmost to keep those costs from mounting ever higher; it is his duty to absorb all the information available bearing on his particular field; to educate himself and to become efficient. The engineer must follow closely all established rules and examine every new suggestion, that he may use his energy and knowledge to the best advantage; the foreman that he may use his tools and men in the most efficient manner; the miner and the prospector that they may accomplish the greatest amount of work with the least expenditure of energy; and all of them that they may do their work in the most sane, safe, and healthful manner.

Some wise heads may say that there is little which is absolutely new in these papers. Perhaps so; but neither is there anything new in the dictionary, and that is a very useful publication, though unfortunately it does not possess the merit of being readable.

The articles which Mr. Mitke has contributed cover completely the fields of which they treat, and in a manner that makes them good reading for all classes of workers. We know this because of the numerous letters of appreciation that have reached our desk. The requests for extra copies of the *Journal* containing these articles have been so numerous that it has been decided to publish them in pamphlet form.

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We wish to hear from mining companies who need men, both mining engineers and miners, and would like to have the names and addresses of those who are retiring from service in the Army and Navy. We are keeping files of concerns that want men and men that want places, and shall do our best to match the two wants in the interest of both parties. We urge mining companies especially to communicate with us if they need either miners or engineers.

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The Rocky Mountain Club naturally would not say anything about this itself, but we think that it has great reason to be proud of itself for the good work that it does in giving a Christmas dinner to the soldiers and sailors and the fine way in which it does it. The Christmas dinner for 1200 soldiers and sailors in the Hotel Astor last week, to which were invited men from all branches of the services, besides the British, Canadian, Australian, French, and whatever other Allies happened to be in New York, was a very excellent dinner. Everything about it was lavish. This refers not only to the food, but also to the entertainment. When the Rocky Mountain Club does anything of this sort, it makes a thoroughly good job of it.

## BY THE WAY

Every member of the 11th Regiment, Engineers, recruited chiefly in New York, has been cited for gallantry while brigaded with British troops in the fighting at Cambrai, according to a letter received at the headquarters of the Association of the 11th Engineers from Col. William Barclay Parsons, the regimental commander, now in France. The 11th Engineers, which is a railway regiment, was one of the first to go over to France, it having embarked before the middle of 1917. It was in this that Irving was a captain.

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One winter night in 1874, runs Dan De Quille's "Big Bonanza," some of the residents of Virginia City were startled by seeing what seemed a column of flame 50 or 60 ft. high shooting up from the mouth of an old shaft near the old upper works of the Ophir company. On reaching the spot, they found that there was no smell of smoke and that the supposed fire was a weirdly white light in which the faces of all were of a corpse-like pallor. The light resembled one of the shooting spires of the aurora borealis, with some of the same waving and inconstant motion. On gazing down the shaft the interior was seen to glow like a furnace at white heat. The timbers were particularly brilliant. Each splinter or bit of fungus seemed darting dazzling rays that streamed steadily in all directions. The phenomenon lasted over half an hour, and was undoubtedly caused by the belching forth of a highly phosphorated gas from the abandoned works.

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Travelers and refugees just out of Russia tell weird tales of the business methods of the Bolsheviki, says the *Evening Post*. A man who knows the big Russian banks intimately says that the bank clerks were regarded with suspicion, as possibly members of the bourgeoise class; hence their wages were cut to the level of the street cleaners, honest men who pushed a broom instead of a pen. Thereupon they quit. So barbers, porters, and other miscellaneous folk were introduced, whose main principle seemed to be the elimination of the ancient axiom that account books should "balance." The bank ledgers, said this observer, will never balance again.

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The medical correspondent of the London *Times* says that it seems reasonable to believe that throughout the world about 6,000,000 persons perished from influenza and pneumonia during the last three months. It has been estimated that the war caused the death of 20,000,000 persons in four and a half years. Thus, the correspondent points out, influenza has proved itself five times deadlier than war, because in the same period, at its epidemic rate, influenza would have killed 100,000,000. Never since the Black Death has such a plague swept over the world, he says, adding that the need of a new survey of public health measures has never been more forcibly illustrated.

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In the days of Porfirio Diaz, many Americans heeded the invitation extended still earlier by Benito Juarez and others to "come and help Mexico develop her resources," or words to that effect. The chances of fair treatment seeming good, one A. R. Shepherd (often known as "Boss Shepherd") took up a little concession of about 61 square miles in the Batopilas mining district, in the State of Chihuahua. The boss stuck rather close to the job, while his first mine was in the making, and, like many a good handler of labor, acquired something of a reputation for proficiency in monologue of the kind that tends to spur industrial effort, but is a little out of place in refined circles. However, it is said that in his home life Shepherd was religious to the point of punctiliousness in such matters as the observance of grace at meals. One Sunday, after a strenuous week in getting the little mill running smoothly, he sat down for a quiet home dinner. With bowed head he asked that the food be duly blessed, getting along nicely in the humble prayer, and with every prospect of success in said concession, when suddenly he detected some interruption of the rhythmic dropping of the stamps. After a brief listening pause, during which machinery matters seemed to be going from bad to worse, he suddenly ejaculated "Now, what in hell is the matter with that —— —— —— of a mill?" During the awkward silence which ensued, the foreman must have detected the trouble, for the battery resumed its former tune, as Shepherd continued, "and for thy blessed grace and loving-kindness we humbly thank Thee, O Lord, Amen."

# The Mining Index

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10257—STELLITE AND HIGH SPEED STEEL Compared. (Iron Age, Dec. 26, 1918; 1½ pp., illus.)

10258—WELDING of Iron and Steel. W. H. Cathcart. (Iron Age, Dec. 26, 1918; 5½ pp., illus.)

## LEAD AND ZINC

10259—ALLOY—Ulco Hard Metal. Francis C. Frary and Sterling N. Temple. (Chem. and Met. Eng., Sept. 28, 1918; 1¾ pp., illus.)

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10325—CHLORINE—Commercial Uses of Chlorine. V. R. Kokatnur. (Chem. and Met. Eng., Nov. 1, 1918; 5 pp.) Review of direct and indirect applications of chlorine in independent uses, metallurgy, poisonous gases, inorganic salts and organic solvents, pharmaceuticals and intermediates; read before the American Electrochemical Society, Oct. 1, 1918.

10326—HYDROMETALLURGY—Calculation of Extraction in Continuous Agitation. Andrew Ham and Harrison Streeter Coe. (Chem. and Met. Eng., Nov. 1, 1918; 4 pp.)

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10330—REFRACTORIES—Carborundum Refractories. S. C. Lanbarger. (Chem. and Met. Eng., Sept. 27, 1918; 3 pp., illus.) Comparative account of silicon carbide refractories, with those in general use; great improvement made in therminal conductivity, efficiency and strength.

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10335—SMELTER FUME—Electrostatic Precipitation. (Bull. 142, A. I. M. E., Oct., 1918; 3¾ pp.) Discussion of paper by I. H. Eschholz, previously indexed.

10336—SMELTER FUME—The Cottrell Electrostatic Recovery Process of Flue Dust and Fumes. H. J. Bush. (Journ. Soc. Chem. Ind., Oct. 31, 1918; 2½ pp., illus.)

**SAMPLING AND ASSAYING**

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**FUELS**

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10348—CHEMICAL PORCELAIN—Recent Developments in the Manufacture of Chemical Porcelain. J. C. Bailar. (Chem. and Met. Eng., Sept. 27, 1918; 1 p.)

10349—CHEMICAL STONEWARE: Preparation and Selection of Materials, Acid-Resisting Tests and Annealing Ware. A. Malinovszky. (Chem. and Met. Eng., Sept. 27, 1918; 2½ pp.) Paper read before Am. Inst. of Chem. Engrs., June, 1918.

10350—CHEMICAL WORKS—Portland Cement Construction for Chemical Works. Maxmilian Toch. (Chem. and Met. Eng., Sept. 27, 1918; ½ p.)

10351—NITRIC ACID—Development in Nitric Acid Manufacture in the United States Since 1914. E. J. Pranke. (Chem. and Met. Eng., Sept. 25, 1918; 2 pp.; also Gen. Elec. Rev., Nov., 1918.) Paper before Fourth Nat. Exposition of Chem. Industries, Sept. 24, 1918.

10352—NITROGEN FIXATION—Direct and Indirect Methods of Nitrogen Fixation. E. Kilburn Scott. (Chem. and Met. Eng., Sept. 25, 1918; 3¾ pp., illus.) Abstract of paper before convention of A. I. E. E., June 27, 1918.

10353—NITROGEN FIXATION FURNACES. E. Kilburn Scott. (Gen. Elec. Rev., Nov., 1918; 11 pp., illus.) Paper before Am. Electrochem. Soc., Sept. 30, 1918. 40c.

10354—POTASH—A Wet Process for Extracting Potash from Cement Dust. J. G. Dean. (Chem. and Met. Eng., Sept. 26, 1918; 8½ pp., illus.)

10355—POTASH—The Kelp-Potash Plant of the Lorned Manufacturing Company. An interview with L. H. Thompson, Vice-President. (Chem. and Met. Eng., Sept. 26, 1918; 3 pp., illus.)

10356—SULPHURIC ACID—Large Scale Sulphuric Acid Manufacture. Andrew M. Fairlie. (Chem. and Met. Eng., Sept. 25, 1918; 4½ pp., illus.) Description of Tennessee Copper Co. plant.

10357—WATER SOFTENERS—Chemical Control of Water Softeners. Louis F. Clark. (Chem. and Met. Eng., Nov. 1, 1918; 4 pp.)

**MISCELLANEOUS**

10358—HEALTH—Mosquito Elimination and Malaria Prevention. C. N. Harrub. (Eng. and Min. Journ., Dec. 21, 1918; 1¾ pp.) 20c.

10359—LABOR—Important Phases of the Labor Problem; Recruiting of Men, Low Labor Waste, High Productivity and the Promotion of Contentment-Collective Bargaining Discussed. Magnus W. Alexander. (Iron Age, Nov. 21, 1918; 4 pp.) An address delivered to the annual convention of the National Founders' Association, New York, Nov. 14.

10360—LABOR—Reciprocity on the Part of Labor Needed to Solve Industrial Problem. J. Parke Channing. (Eng. and Min. Journ., Dec. 14, 1918; 1¾ pp.) 20c.

10361—LABOR—Welfare Work in the Mining Industry. H. Lipson Hancock. (Chem. Eng., Oct. 5, 1918; 7½ pp., illus.)

10362—MANAGEMENT—The Personal Element in Management. (A. M. Heckman. (Min. and Sci. Press, Oct. 19, 1918; 1½ pp.)

10363—POWER—Its Significance and Needs. Chester G. Gilbert and Joseph E. Pogue. (Bull. 102, Part 5, U. S. National Museum, 1918; 53 pp., illus.)

10364—REINFORCED CONCRETE vs. Salt, Brine and Sea Water. Henry J. M. Creighton. (Chem. and Met. Eng., Oct. 15, 1918; 5¼ pp., illus.) Paper before Faraday Socy., July 28, 1918. Cites many examples of failure in reinforced concrete, showing the cause to be due to electrolytic corrosion of reinforcements.

## Personals

**Have You Contributed to the Association of the 27th Engineers?**

**Harry J. Wolf** examined mining property in Clear Creek County, Colo., during the early part of December.

**George Crerar** recently spent a short time in Salt Lake City, Utah, on his way to San Luis Potosi, Mexico.

**Maxwell W. Atwater,** mining engineer, has been appointed manager of the Davis-Daly Copper Co., of Butte, Montana.

**C. H. McCullough, Jr.,** vice-president of the Lackawanna Steel Co., has been elected president of the company, to succeed **E. A. S. Clarke.**

**Bulkeley Wells,** who was recently elected president of the American Mining Congress, to succeed **Walter Douglas,** has returned to Denver.

**Herbert G. Officer** has resigned his commission in the Air Service and is now with the Andes Copper Mining Co., 42 Broadway, New York.

**Morris P. Kirk,** mining engineer, of Salt Lake City, Utah, has been appointed general manager of the Yellow Pine Mining Co., Goodsprings, Nevada.

**G. M. Colvocoresses,** mining engineer, recently went to Lark, Utah, to inspect the mine and mill of the Ohio Copper Mining Co., of Utah, with which he is connected.

**M. S. MacCarthy** and **J. M. McClave** examined properties at Jamestown, Boulder County, Colo., last week, on which discoveries of uranium and radium were reported.

**G. H. Clevenger** has completed research work at Colorado Springs for the U. S. Bureau of Mines, and after Jan. 1 will be with the National Research Council, Washington, D. C.

**L. R. Robbins,** mining engineer and geologist for the Tonopah Belmont Development Co., of Tonopah, Nev., has been appointed general superintendent of mining for the company's Tonopah property.

**Oba Wiser,** metallurgical engineer, has resigned as assistant mill superintendent of the Chino Copper Co., of Hurley, N. M., to accept the management of the Republic Mining and Milling Co., Hanover, New Mexico.

**Lieut. Roy B. Earling** has been discharged from the National Army, in which he has been serving as an artillery instructor, and has returned to Metcalf, Ariz., where he will continue in charge of the Arizona Copper Co.'s mines.

**M. L. O'Neale** has resigned as superintendent of the Connellsville Basin Coke Co., near Morgantown, W. Va., to accept the position of mine and mill superintendent of the New York Pyrites Co., of Gouverneur, New York.

**W. D. B. Motter, Jr.,** mining engineer, has resigned as manager of the Benson Mines Co., Benson Mines, N. Y., to join the staff of the Guggenheim Brothers as assistant consulting mining engineer, with headquarters at 120 Broadway, New York.

**C. E. Wheelock,** of Mogollon, N. M., recently registered at the office of the American Institute of Mining Engineers, New York. Others who registered there during the week were James T. Nixon, London, England; Lieut. H. G. Mathews, Los Angeles, Calif.; H. M. La Follette, La Follette, Tenn.; C. F. Moore, Boston, Mass.; L. G. Weeks, Bisbee, Ariz.; R. B. Eldredge, Colorado Springs, Colo.; and P. J. Bandy, Mexico City, Mexico.

## Obituary

**L. S. Woodbury,** president of the Great Falls Iron Works, Great Falls, Mont., died Nov. 22.

**Sherman Henry Boright,** manager of the Lonely Reef mine, Rhodesia, died of pneumonia Nov. 2. He was a charter member of the Canadian Mining Institute.

**Gideon J. Giroux** died at Nogales, Ariz., of heart failure, aged 70 years. For many years he was superintendent of the Sultana mine, near Carbo, Sonora, Mex., and had a share in that property at the time of its purchase by the Cole-Ryan interests.

**Keith C. Fraser,** assistant superintendent of the Bartlesville Zinc Co., died of pneumonia, following influenza, on Dec. 12. He was a graduate of the School of Mines, Rolla, Mo., and had been connected with the Bartlesville Zinc Co. for several years.

**Harold E. Martin,** district engineer of the Oliver Iron Mining Co., with headquarters at Eveleth, Minn., died of pneumonia following an attack of influenza on Dec. 16, aged 36 years. He entered the service of the Oliver Iron Mining Co. in the operating department at Hibbing, Minn., January, 1906, and in September, 1913, was transferred to the engineering department. He was later made chief engineer of the Hibbing and Chisholm districts, which position he held until January, 1917, when he was made chief engineer of the Virginia district.

## Societies

**The Mining Convention** which was to have been held in Vancouver, B. C., under the auspices of the Vancouver Chamber of Mines during the first week in January, 1919, has been postponed indefinitely.

**American Mining Congress,** California committee, has called a convention of all mineral and oil producers for Jan. 15 and 16, 1919, at the Palace Hotel, San Francisco. A state chapter is to be organized. This convention had been postponed on account of the epidemic. The annual meeting of the Colorado Chapter was held in Denver on Jan. 2-4.

**A New Metallurgical Society,** exclusively confined to the branches dealing with steel, iron, and their alloys, was decided upon recently at a meeting of a number of prominent metallurgists at Pittsburgh. The aim of the society will be the promotion of the arts and sciences connected with the metallurgy of iron, steel, and their alloys. A committee to complete the plans formed at this meeting was appointed, and D. L. Mathias, of Mackintosh, Hemphill & Co., Pittsburgh, was selected as chairman. The necessary data and steps to materialize the society are now being prepared by this committee.

## Technical Schools

**University of Idaho,** at Moscow, Idaho, will establish a vocational school for miners at Wallace, Idaho. An eight-weeks' term will be held, at which will be given practical instruction in rock breaking, use of powder, timbering, pumping, and other underground work. Most of the time will be spent in one of the large mines. Frank H. Skeels, mining engineer, will be in charge. The course is established under the recent Smith-Hughes Act, under which the Federal Government pays half the cost and the state, the other half.

**Harvard School of Engineering** has been reörganized, and its courses will be open to students on Jan. 1, continuing during the summer to enable the entrants to complete a full year's work by the opening of the next academic year in September. Some time ago Harvard University and the Massachusetts Institute of Technology agreed to combine effort in engineering instruction, making use of funds provided under the will of the late Gordon McKay. The agreement was objected to, and the Massachusetts Supreme Court held that the arrangement was not in accord with the provisions of the will. The new arrangement has been approved both by the trustees of the McKay estate and by the governing boards of the university. The instruction will be carried on entirely by a Harvard faculty, appointed by the university governing boards, and students who satisfactorily complete four years of study will receive the degree of bachelor of science. Higher degrees will be granted after additional study. Instruction will be offered in the following subjects; mechanical engineering, civil engineering, sanitary engineering, electrical engineering, mining and metallurgy, and industrial chemistry. The faculty includes the following: Henry Lloyd Smith, professor of mining and metallurgy; George Sharp Raymer, assistant professor of mining; Albert Sauver, professor of metallurgy and metallography; and Louis Caryl Graton, professor of economic geology.

## Industrial News

**Goodyear Tire and Rubber Co.,** Akron, Ohio, completely reorganized its plant from a war to a peace basis within a few days after the armistice was signed. Seventy two hundred and fifty employes were engaged, in whole or part, on Government work, and less than 12% of them lost as much as one day from work.

**Wellman-Seaver-Morgan Co.,** Cleveland, Ohio, has opened a San Francisco office at 415-417 Rialto Bldg., in charge of Norman S. Ross. Business originating from California, Nevada west of the 115th meridan, Lower California, and Josephine, Jackson and Klamath counties in Oregon will receive the attention of Mr. Ross. Horace N. Trumbull, recently discharged from the Engineer Officers' Training School at Camp Humphreys, Va., and formerly advertising manager of the SKF Ball Bearing Co., of Hartford, Conn., has been appointed advertising manager of the W-S-M Co. at Cleveland.

## Trade Catalogs

**Gasoline Locomotives.** J. D. Fate Co., Plymouth, Ohio. Catalog No. 4, Bull. A. 8½ x 11; pp. 21; illustrated. Specifications and descriptions of three-ton and six-ton sizes of Plymouth gasoline locomotives.

**Jeffrey Bucket Elevators.** The Jeffrey Manufacturing Co., Columbus, Ohio. Catalog No. 244; 8½ x 11; pp. 71; illustrated. Gives details of elevators selected from numerous styles used in handling materials in many industries of the country. Now ready for distribution.

**Rails.** Walter A. Zelnicker Supply Co., 325 Locust St., St. Louis, Mo. Bull. 250; 3½ x 8½; pp. 84; illustrated. Descriptive of rails, locomotives, cars, cranes, shovels, pipe, machinery, tanks, steel piling, power plant equipment, machine tools, wire rope, hoists, and contractors' equipment. Copy free on request.

## New Patents

United States patent specifications may be obtained from "The Engineering and Mining Journal" at 25c. each. British patents are supplied at 40c. each.

**Filtration**—Process of Extracting Solids. Ellis Edgar Howson, Salt Lake City, Utah. (U. S. No. 1,284,346-7; Nov. 12, 1918.)

**Furnaces,** Lining for. Walter C. Ely, Terre Haute, Ind. (U. S. No. 1,284,880, Nov. 12, 1918.)

**Furnace,** Metallurgical. John Kralund, Brooklyn, N. Y., assignor to Doehler Die Casting Co. (U. S. No. 1,284,711; Nov. 12, 1918.)

**Kilns**—Apparatus for Utilizing Waste Heat and Increasing Circulation of Air During Drying and Burning Processes. Thomas B. Sullivan, Kansas City, Mo. (U. S. No. 1,284,943; Nov. 12, 1918.)

**Leaching**—Process for Recovering Metals from Ores. Clarence L. Larson, Kellogg, Idaho, assignor to Bunker Hill & Sullivan Mining and Concentrating Co., San Francisco, Cal. (U. S. No. 1,284,910; Nov. 12, 1918.)

**Magnetic Separator** for Sorting Heterogeneous Material. Daniel R. Bryan, Chatham, N. J. (U. S. No. 1,284,872, Nov. 12, 1918.)

**Retort,** Continuous Rotary. Paul S. Shoaff, Long Beach, Calif. (U. S. No. 1,284,479; Nov. 12, 1918.)

**Steel**—Manufacture of Steel Direct From Iron Ores. Luis Tejero Grouselle, Grenoble, France. (U. S. No. 1,284,094; Nov. 5, 1918.)

**Sulphuric Acid,** Process and Apparatus for Producing. Harry V. Welch, Los Angeles, Calif., assignor to International Precipitation Co., Los Angeles, Calif. (U. S. Nos. 1,284,166-7; Nov. 5, 1918.)

**Sulphuric-Acid Manufacture.** Linn Bradley, East Orange, N. J., assignor to Research Corporation, New York, N. Y. (U. S. No. 1,284,175; Nov. 5, 1918.)

**Tunneling** Machine. Edward S. McKinlay, Oak Creek, Colo. (U. S. No. 1,284,398, Nov. 12, 1918.)

# Editorial Correspondence

### WALLACE, IDAHO—Dec. 26

**Suspension of the Law Requiring Annual Assessment Work** on mining claims for the year 1919 is being discussed, and sentiment in the Cœur d'Alene district appears to favor it. Owing to unsettled industrial conditions that will probably prevail throughout 1919, there is a strong feeling that claim owners should be relieved of performing the annual labor. Labor and prices of mining supplies will no doubt remain at a high level during the year, though possibly lower than they are now, so that little would be accomplished for the expenditure, which, even in normal times, is little more than an evidence of good faith exacted from the claimant, and is of little value so far as developing a mine is concerned. However, there is no sentiment in favor of suspending the law beyond 1919.

**Property Rights of the Caledonia Mining Co.,** Kellogg, Idaho, whether received by grant from Bunker Hill & Sullivan Mining and Concentrating Co. or otherwise, are held in perpetuity without restrictions or reservations by the company, Stanley A. Easton, president, has recently notified stockholders of the Caledonia company. Mr. Easton terms the following a misstatement, it having just come to his attention: "As a result of apex litigation in 1914, when the Bunker Hill & Sullivan Mining Co. obtained control of Caledonia by receiving 1,305,000 shares of new stock, making the issued stock 2,605,000 shares, par $1, a stipulation was made, in conformity to Cœur d' Alene practice, under which the Caledonia property would go to the B. H. & S. Co. in event that Caledonia should exhaust its ores or failed to operate at a profit. For the protection of the minority stockholders a further stipulation forbade the use of Caledonia's funds for the purchase of outside properties. This means that in the event of the happenings of the first stipulation Caledonia will lose title to its holdings and cease to exist."

### DENVER, COLO.—Dec. 26

**Importation of Mexican Labor** into Colorado to supply the urgent demands of the mining industry is a possibility in the near future. The matter has received the consideration of the U. S. Immigration Service, in coöperation with the U. S. Employment Service, and the proposed importations will be permitted under such restrictions as may be made by the director-general of the latter organization.

### HOUGHTON, MICH.—Dec. 29

**The Operation of the Flotation Process** in the Michigan district may be looked upon as the most important development made in copper extraction in the district during 1918. The most conspicuous success of flotation has been achieved by the White Pine company, a Calumet & Hecla subsidiary. The output of copper now runs close to half a million pounds a month, practically double the output secured before the use of flotation. This doubling in production has been accomplished without any increase in rock tonnage and with very little betterment in quality of rock mined. Two shafts are furnishing the rock. A third shaft is sinking, exploring and opening the lode, which continues erratic as ever. However, openings are now far enough in advance to assure continuance of operations at present rate of production for five years, regardless of further openings with depth. The third shaft is opening good-looking rock.

**The Seneca Shaft** is now 60% around the curve. It has attained a depth of 1612 ft. The Kearsarge lode proper ought to be struck at 1625 ft. Sinking had been interrupted for a week, owing to the fact that a station had to be built at 1600 ft., a fork cut to take care of the water coming into the shaft, and plans completed for an underground hoist at this point, as the bucket cannot make the curved shaft satisfactorily. Seneca has broken the world's record for shaft sinking in copper mining work. The first drilling was done Feb. 13, 1918, and the speed attained in putting this shaft down has been remarkable. The men employed were experts, in direct charge of one of the best shaft men in northern Michigan. In addition to the highest wage scale ever paid for similar work, a straight bonus went to all of the men. Despite published statements, no arrangements have been made for stamp milling the Seneca output, when it comes from the lode. It will probably be six months before enough rock will be ready to need a stamp mill. After the shaft cuts the lode it will go through it, down through the footwall trap. Then the first crosscut will be run and drifting started. Even then, the sources of rock supply will be limited to two places in the lode. The construction of the headframe in the shafthouse has been completed. The crusher and motor have been ordered and ought to be delivered within two weeks.

### BOSTON, MASS.—Dec. 21

**The Alaska-Juneau Gold Mining Co.** has called a special meeting of stockholders for Jan. 10 to vote on the issue of $3,500,000 first mortgage 10-year 7% gold bonds, of which $1,500,000 or so much as may be necessary will be exchanged at par for outstanding obligations and floating debt; $500,000 will be sold at not less than par to stockholders. The proposed issue is to provide funds for retiring floating debt and to pay for alterations and improvements to the milling plant, estimated to cost $500,000. The present mill, as originally designed and erected, contained many experimental features that have turned out to be unsuitable for the ore. With no funds and shortage of labor, working out a remedial operation has been slow and costly. Under the proposed plan of improvement and alteration, the company estimates that within two years its milling capacity will be brought up to 8000 tons a day by an expenditure not to exceed $500,000. According to President Bradley, these milling improvements will permit the property to earn an operating profit in normal times of $1,400,000 per year. In January of this year Alaska-Juneau crushed 118,809 tons of rock, of an average assay value of 69½c. per ton, losing 17.40c. in tailings, at a milling cost of 43c. per ton. In September the company treated 21,045 tons of ore, of an assay value of $1.32 per ton, and lost 19.50c. per ton in tailings. Milling costs this month have jumped to $1.17 per ton. In short, its cost of milling this ore, exclusive of general and administrative expenses, was but a few cents less than the total gold value of the ore itself. The average for the 10 months to Nov. 1, with October officially estimated, gives 498,861 tons treated, of an average assay value of 86.50c. per ton, of which 17⅞c. per ton was lost in tailings. Total mill extraction was 79½% and average cost 63c. per ton. Thus the company recovered from 498,861 tons of ore a net value of $376,707, for which it had to pay in operating expenses 63c. per ton, or $314,282, and this does not include administration and general expenses.

### VICTORIA, B. C.—Dec. 28

**An Embargo on Lead Ore and Concentrate Shipments** to the Trail smeltery is the substance of a report now in circulation. The explanation given is that there must be a hiatus until settled peace conditions are established. It is suggested that such embargo will be likely to remain in effect all winter.

**The Vancouver Assay Office** stopped its purchases of platinum on Dec. 31. This institution was opened during the latter part of the war to encourage platinum production in Western Canada. In this connection, the placers of the Tulameen River were prospected by representatives of the Imperial Munitions Board in Canada. Indications were that, if work development were continued as energetically as it started, a considerable quantity of platinum would be recovered. With the war over and the demand much lighter, operations by the government on the Tulameen River have ceased. The Vancouver assay office was established to receive this platinum, as well as that recovered by companies or individual prospectors and operators throughout the province, and also that of private individuals. Payment was made at $105 an oz. It is oelieved that the Canadian government will not do away with the assay office, but will maintain it for the benefit of prospectors and miners.

**A Petition to Establish an Ore-Testing Plant in British Columbia** and to continue drilling placer ground on the Tulameen River will be presented to the dominion government by the mining bureau of the Vancouver Board of Trade. The same organization proposes asking the provincial government for an explanation of its failure to diamond-drill iron properties of the province to estimate the available tonnage of magnetite and hematite ores. With respect to the ore-testing plant, it is asserted that British Columbia operators are handicapped because they have to send sample shipments to Ottawa for treatment. The type of plant required would cost about $75,000, it is stated, and such an expenditure would be amply repaid in benefit to the mining men and the industry. As to Tulameen platinum operations, it will be pointed out that during the last three months 14 holes have been drilled and that the showings obtained fully warrant further prospecting. To discontinue the work now, it is argued, would be wasteful and unjustified. It has been demonstrated that this valuable mineral exists in the placer ground, and the commercial possibilities of the resource should be determined before the work is abandoned.

**A Bounty of Fifty Cents a Ton on Iron** mined and smelted in Canada, to be paid by the dominion government, and the establishment, with the support of the federal administration, of a blast furnace and steel plant at or near the city of Port Arthur, Lake Superior, are asked for in petitions to be laid before Premier Borden at an early date by the people of the district of Port Arthur. Arguments for the bounty are as follows: That during the last decade over 90% of the product of Canadian furnaces was from imported ore; that the proportion of domestic iron ore smelted in Canada has gradually declined until, in 1917, it was only 4.23%; that a large tonnage of Canadian iron ores could be made available for use by some preliminary treatment, if the cost of such treatment were compensated for by a bounty, the ores of the Atikokam Range requiring roasting, Loon Lake ores hand sorting, Magpie siderite ores calcining, and Moose Mountain and Bathurst ores concentrating; that extensive areas of promising iron formations exist in Canada, and it is reasonable to expect that merchantable ore will be found in these ranges when systematically exploited. It is also held that such a bounty would stimulate prospecting and would indirectly increase the customs receipts of the dominion. In support of the petition for a dominion furnace and steel plant it is stated: That practically all the steel plants in the dominion are in eastern Canada and have received $16,000,000 in bounties; that between 1905 and 1915 Canada imported iron and steel products to the value of about $632,000,000; that the population of western Canada is now over 2,000,000 and in 10 years has increased 174%, whereas that of eastern Canada has increased only 17%; that there are about 19,000 miles of railway in western Canada radiating westward from the city of Port Arthur, and manufacturing plants representing over $308,000,000; and that the United States Steel Corporation some years ago erected a large steel plant at Duluth at a cost of over $25,000,000 to supply the requirements of the Western states and is about to proceed with the erection of additional mills at a cost of approximately $15,000,000. The policy recommended to the dominion government in the launching of the proposed industry is that the cost be placed at about $15,000,000 and that the interest for 30 years on 80% of the actual capital invested be guaranteed, or that the same guarantees be allowed as have been given to Canadian drydocks and shipbuilding plants, to the extent of about $13,000,000.

# The Mining News

### ALASKA

NOVEMBER SHIPMENTS of domestic copper ore, matte, etc., from Alaska to United States were 11,574 gross tons. The copper contents was 6,607,216 lb., valued at $1,704,925.

ALASKA GASTINEAU (Thane)—Second shift put on at Thane mill. Will soon add third shift. Labor supply better. Practical miners scarce.

### ARIZONA

#### Cochise County

HILLTOP (Paradise)—Struck orebody 1900 ft. from portal of lower tunnel. Ore of same grade as in upper tunnel.

#### Greenlee County

SHANNON (Clifton)—Manager J. W. Bennie denies company is to close down, as reported from Boston.

#### Pima County

STUMP (Silverbell)—Sold by George H. Daily to Charles H. Behr, of New York, who will sink present 75-ft. shaft to 400 ft. and install surface equipment. Ore carries copper, lead and silver.

#### Pinal County

MAGMA COPPER (Superior)—November copper production was 992,271 pounds.

#### Santa Cruz County

HOSEY (Patagonia) — Installed compressor plant and breaking ore with machine drills.

THREE R (Patagonia)—Purchased by Gunn-Thompson interests, through Magma Copper Co., of Superior. Property under examination for several months. Well-developed and has been shipping good-grade copper ore. Reserves of low-grade sulphides believed to warrant erection of large concentrator.

#### Yavapai County

DUNDEE-ARIZONA (Jerome)—Starting extension of tunnel workings past shaft at 120 level, to cut sheared zone, expecting to develop body of carbonates and oxides. Planning for treatment plant, if ore found warrants expense.

GRAND ISLAND (Jerome)—Shaft down about 450 ft. and sinking rapidly.

JEROME-PORTLAND (Jerome)—R. B. Westervelt, attorney of Prescott, appointed receiver, succeeding Frank H. Dyer.

JEROME VERDE (Jerome)—Shipping 600 tons a month of 8% copper ore.

UNITED VERDE EXTENSION (Jerome)—New 60-room employee's hotel opened Jan. 1.

VERDE COMBINATION (Jerome) — President John L. Dyer denies consolidation is considered between company and Green Monster and Grand Island companies. During last year Combination has done about 5500 ft. of work.

### ARKANSAS

#### Marion County

EDITH (Rush)—Taken over by John De Costa and associates, of Kansas City, Mo., who will start operations immediately. Ore zinc carbonate. Plant includes modern mill. Formerly heavy producer. Capt. Charles Le Vasseur in charge.

MONTE CHRISTO (Rush)—Producing free hand-cobbed carbonate with small force.

SURE POP NO. 2 (Rush)—Two good runs of ore recently disclosed in straightening some drifts.

### CALIFORNIA

#### Calaveras County

ESPERANZA (Mokelumne Hill)—Mine abandoned and machinery sold. Idle for 20 years. Once worked on large scale, employing 100 men. Recent high costs of mining prevented expected reopening.

#### Colusa County

PLATINUM DEPOSIT near Fouts to be developed by John M. Connolly, of Willows, during winter. Opened by tunnel. Ore carries gold and traces of platinum.

#### Eldorado County

STEEL CHROME (Placerville) — Attached for lumber account of $5500. Plant and mine, 12 miles from Folsom, idle; 80 tons of ore and concentrates ready for shipment, but no market. Case typical of other chrome mines.

#### Kern County

SILVER STAMPEDE reported from Randsburg district by Wade Hampton Williams and John W. Kelly, of Amalie and Bakersfield. High-grade silver ore, 16 miles west of Randsburg.

#### Modoc County

HESS (Alturas)—Produced $20,000 last season under lease to Peter Keegle. Ore reserve sufficient for two years' run of mill.

#### Nevada County

IDAHO MARYLAND (Grass Valley)—Property of Maryland Gold Quartz Mining Co. sold by S. P. Dorsey Estate, owners, to Eastern capitalists, represented by Rufus Thayer, attorney, and Bulkeley Wells. Mines closed since 1894. New officers elected were Roy H. Elliott, San Francisco, president, and Rufus Thayer, secretary. A new board was elected, but names were withheld.

EMPIRE-PENNSYLVANIA (Grass Valley)—Usual tonnage being crushed in Empire 60-stamp mill. Quicker delivery soon of Pennsylvania ores due to completion of new electric ore car line.

GOLDEN CENTER (Grass Valley)—Unwatering completed to 1800 level, permitting development at that depth for first time in years.

NORTH STAR (Grass Valley)—Underground crew increased in Champion. Development resumed on extensive lines followed before war. Labor supply better and some supply costs lower. No indication of wage reduction.

#### Plumas County

DROEGE (Greenville)—Development disclosed good ore near main workings. Additional equipment planned.

#### Riverside County

PALISADE (Blythe)—To ship ore to El Paso smeltery. New motor-truck road under construction. Four carloads bismuth lead-silver ore of good grade on dump.

#### Shasta County

CRYSTAL (Igo)—Reopened by A. N. Kingsbury, lessee, after 30 years' idleness; only silver mine in Shasta County. Ore carries high-grade silver and some gold. Mine relocated as White Star. Owned by J. P. Kingsbury, W. D. Bull and W. H. Hubbard, all of Igo.

AFTERTHOUGHT (Ingot) — Flotation plant started Dec. 18. Plant and improvements said to have cost $750,000. Capacity, 300 tons in 24 hours. Saves both zinc and copper. Especially adapted to Afterthought ores, of different character from others in Shasta copper region. Mine and mill employ 100 men.

MAMMOTH (Kennett) — Arrangements being made for handling ore from Spearhead mine in Nevada.

#### Sierra County

MARIPOSA (Alleghany)—Ore from new ground supplying mill steadily.

SLATE CREEK HYDRAULIC (Port Wine)—Large concrete dam completed. Will start piping when water is available.

#### Trinity County

ESTABROOK GOLD (Trinity Center)—New dredge launched. Designed by Union Construction Co. of San Francisco.

#### Tuolumne County

DUTCH-APP-SWEENEY (Jamestown)—Mill construction progressing. Large reserves in lower levels.

BELMONT-SHAWMUT (Shawmut) — Sixty-stamp mill and flotation plant in full operation. New work on lower levels adds to reserves. Large crew retained, despite labor shortage.

FORTUNA (Sonora)—New mill treating ore from recent development. Eaton and Hamilton, owners.

DEAD HORSE (Sonora)—Mine and others in group to be reopened. Developed by 1800-ft. tunnel, to be used as working-level and equipped with electric hoist. Rebuilding New Albany flume. Surface buildings to be removed to better sites. Otto Heiser, superintendent.

#### Yuba County

SMITHURST (Browns Valley)—Optioned to Samuel Bowden. To be unwatered. Adjoins Rattlesnake mine, formerly high-grade producer.

### COLORADO

#### Clear Creek County

GAUNTLET GOLD (Idaho Springs)—Organized to take over and develop old Mammoth mine. Will operate through Argo tunnel. A. D. Hobson, superintendent.

#### San Juan County

CALEDONIAN M. & M. (Silverton)—Mill recently overhauled. Satisfactory test run made on ore developed during last few months. G. Gustafson, mill superintendent.

#### San Miguel County

NOVEMBER SHIPMENTS of concentrates from Telluride district were 55 cars from Smuggler-Union and Black Bear; for same period last year, 132 cars.

BELMONT-WAGNER (Telluride)—Mine and mill down owing to labor shortage and influenza.

COLORADO VANADIUM (Telluride)—Opening new vanadium mine above Fall Creek station, on San Miguel River. Boiler plant, compressor, and 2300-ft. aërial tramway will be installed at once. Company will also develop its ground on Bear Creek side of San Miguel River. Ore to be treated at plant of Primos Chemical Co., Vanadium, Colorado.

#### Summit County

BLUE FLAG (Breckenridge)—Will develop Illinois Gulch property during winter. Owned by Blue Flag Mining Co., of Cripple Creek. Property equipped with mill. B. F. Hall, superintendent.

FARNCOMBE HILL GOLD DREDGING (Breckenridge)—Worked under lease by Tonopah Placer Co., with No. 2 dredge.

LIBERTY LEASING (Breckenridge)—Operating old Monte Cristo mine in upper Blue River section of district. Has remodeled and electrified milling plant. Frank Peabody, superintendent.

SILVER KING (Breckenridge)—Being developed under lease and bond by State Senator Siewers Fincher. Crosscutting from shaft to No. 3 vein.

#### Teller County

REVA GOLD (Cripple Creek)—Developing properties of Rose Nicol Gold Mining Co. under bond and lease. Sinking main shaft. Will sink 150 ft. more and cut ninth level station.

VICTOR (Victor)—Komat Leasing Co. developing. Will make trial shipment soon.

### IDAHO

#### Shoshone County

RICHMOND (Adair)—Sinking winze from main tunnel 1000 ft. from portal.

NABOB (Beeler)—Inspected by J. F. Harrington, of New York, president. Will increase mine force and build 150-ton mill by spring.

IDAHO-CARBONATE HILL (Mullan)—Work stopped until spring owing to labor conditions and influenza. Shaft down 440 ft. Preparing to crosscut vein.

ST. JAMES (Wallace)—Installing compressor. Will continue crosscut to vein, identical with Sunset, on west.

SUCCESS (Wallace)—On 1600, lowest level, ore shoot 3 to 7 ft. wide proved for over 100 ft. Marked increased in lead as compared with zinc. Good orebodies, mostly zinc, on 1500, 1400 and 700 levels.

### MICHIGAN

#### Copper District

CALUMET & HECLA (Calumet)—Copper production in November was 10,499,711 lb. Producers were: Ahmeek, 1,773,127 lb.; Allouez, 451,518; C. & H., 5,036,575; Centennial, 196,274; Isle Royale.

1,318,059; La Salle, 131,033; Osceola, 1,150,640; Superior, 96,000; and White Pine, 346,485 pounds.

ISLE ROYALE (Houghton)—Mill closed down for Christmas; first interruption since July 4.

**Iron District**

SALISBURY (Ishpeming)—Two miners killed by fall of ground on Dec. 19. No explanation given for cave.

NEGAUNEE (Negaunee)—Three miners rescued Dec. 22 from caved drift in No. 2 workings after being entombed for 63 hours. Body of William Medlyn, who was instantly killed, was recovered.

## NEVADA

**Esmeralda County**

GOLDFIELD MERGER (Goldfield)—Crosscut on 1350 level in ore. Spearhead discovery nearby said to strike into Sunflower claims; will prove ground from west crosscut on 1100 level.

SPEARHEAD GOLD (Goldfield) — Applied to Tonopah & Tidewater R. R. for spur to mine shaft. Will build ore bin. Expect to ship to United States S. and R. Co. at Kennett, California.

**Lyon County**

WESTERN NEVADA (Mason)—Nevada-Douglas Copper Co. shipping 100 tons sulphide ore daily. Hauled to railroad by motor truck.

MASON VALLEY MINES (Thompson)—November copper production was 1,073,400 pounds.

**Mineral County**

LOUISANA CONSOLIDATED (Mount Montgomery)—Examined by Samuel Newhouse with view to installing new machinery and reopening.

**Nye County**

GOLD-SILVER DISCOVERY reported at Mud Springs, 60 miles from Fallon. First claim located by "Diamondfield" Jack Davis. Shaft sunk 50 feet.

TONOPAH DISTRICT ore production for week ended Dec. 21 was 7651 tons, having a gross milling value of $130,067. Producers were Tonopah Belmont, 2088 tons; Tonopah Mining, 1100; Tonopah Extension, 2328; West End, 944; Jim Butler, 155; Montana, 245; Tonopah Divide, 300; MacNamara, 412; Rescue, 70, and miscellaneous, 9 tons.

MAYFLOWER CONSOLIDATED (Pioneer)—Controlling interest has changed hands, John H. Miller, of Hawthorn, being one of largest stockholders. Work resumed on 500 level of main shaft. Will drift on vein to connect with Starlight shaft, 1400 ft. away. W. J. Tobin, general manager.

REORGANIZED PIONEER (Pioneer)—Will sink main shaft, now 420 ft. deep, to 800 level. Lateral development on 170 level of K. and K. claim has opened milling-grade ore.

**Storey County**

UNION CONSOLIDATED (Virginia City)—Assessment of 10c. per share levied upon capital stock on Dec. 11.

**White Pine County**

CONSOLIDATED COPPERMINES (Kimberly)—November production was 1,278,116 lb. of copper, all from Kimberly operations. Of total, 543,912 lb. came from Morris Brooks ore concentrated at Kimberly mill; 721,205 from direct smelting Alpha ore; and 12,999 from ore mined by lessees. Kimberly mill made 82% extraction for month. Development progressing at Alpha mine. Work delayed on 1300 level by heavy waterflow.

## NEW MEXICO

**Grant County**

MANGANESE SHIPMENTS in November by Kirchman & Crawford and C. Amory Stevens, two operators, totaled 200 cars. Payroll for month was over $30,000.

HANOVER-BESSEMER (Hanover) — Shipments of iron ore to Colorado Fuel and Iron Co. at Pueblo continue at rate of 700 to 800 tons per day.

REPUBLIC (Hanover)—Shipping high-grade zinc sulphide to smeltery at rate of 12 cars per month. New shaft still in limestone.

UNITED STATES COPPER CO. (Hanover)—New shaft down 500 ft.

CHINO COPPER (Hurley) — Primary flotation being tried in section seven of mill. Initial results said to show better recovery than made in other sections where flotation follows gravity concentration.

HERMOSA COPPER (Santa Rita)—Holdings purchased by Chino Copper Co. About 40 claims included. Part of ground will be used by Chino for disposal of waste from stripping operations.

BLACK HAWK (Silver City)—Lease and bond secured on 14 claims in southwestern part of Hanover district. Will start development work at once. E. D. Lidstone, manager.

**Lincoln County**

VERA CRUZ LEASING (Carrizozo)—Mill to be enlarged to 100-ton capacity. Will add cyanide plant. R. B. Foster, of El Paso, president and manager.

**Socorro County**

JOHNSON (Mogollon)—Shipping high-grade ore to smeltery from new north and south vein recently cut. Main shaft at Socorro plant now down to 1200 level. Station and crosscuts started.

MOGOLLON MINES (Mogollon)—Milling ore opened on third level recently. Preparing to operate at Deadwood mine.

OAKS (Mogollon)—Work on ore bins, track grade to Central shaft, and hoist installation progressing for new tramway.

**Taos County**

R. & S. MOLYBDENUM (Questa)—Driving three tunnels in ore averaging 10% $MoS_2$. Flotation mill rebuilt, and to produce one ton 80% $MoS_2$ daily within 30 days. Forty men employed. New 100-ton flotation unit planned; survey completed, and work to start in spring. Will run by water power. Operators, M. B. Rapp and C. W. Savery. Information furnished by former.

## OKLAHOMA

**Joplin District**

AMY T. (Miami)—Has reached ore in new shaft at 250-ft. depth.

ASSOCIATED (Quapaw)—Operation of new mill begun.

ST. LOUIS S. & R. (St. Louis, Okla.)—Installing hand jig plant on Weiss lease, south of Hockerville.

## PENNSYLVANIA

**Chester County**

CRUCIBLE ROCK GRAPHITE (Chester Springs) — New electrostatic installation working satisfactorily on graphite.

## TENNESSEE

**Polk County**

OCOEE COPPER (Ducktown)—Sinking shaft to orebody. Company incorporated in 1917, successor to Chattanooga Copper Co. E. Whinnen, superintendent; J. I. Carter, president. Headquarters, Chattanooga.

## TEXAS

**Brazoria County**

FREEPORT SULPHUR (Freeport)—Will build topping plant of 3600 bbl. capacity at its property to skim Mexican crude oil, of which it uses 4000 bbl. per day. Will save 400 bbl. of distillates per day.

## UTAH

**Juab County**

CENTENNIAL EUREKA (Eureka)—Preparing to follow ore on 1900 level below water level, which is at 2100 ft. Some old development on 2300 level.

CROWN POINT (Eureka)—Arranging to continue sinking from 800 level to 1000-ft. depth.

IRON KING (Eureka)—Shaft down 1200 ft. Will go to 1400 level instead of drifting at 1200 level, as intended. Will prospect for ore channel opened in Tintic Standard to south.

UNCLE SAM (Eureka)—Operated entirely by lessees.

**Salt Lake County**

SELK (Alta.)—Working 12 men and shipping about carload of ore per week.

BINGHAM AMALGAMATED (Bingham Canyon)—Workings drained by connecting 400 level with Congor on the northwest, which is reached by raise from Montana-Bingham tunnel.

BIG COTTONWOOD CONSOLIDATED (Salt Lake)—Contract given to extend main tunnel 100 feet.

**Summit County**

NEW QUINCY (Park City)—New ore being developed by winze below 900 level. Fissure four feet wide and carries varying amounts of silver-lead ore, which is being saved.

## CANADA

**British Columbia**

MAGNESITE discovery along railroad in Cariboo district, reported by A. Dean, 103 Carter-Cotton Bldg., Vancouver, B. C., who claims rock showing 83% magnesium carbonate is on surface.

W. G. TANNER developing copper property, four miles east of Agassiz, B. C., owned by Kennedy & Sullivan, Seattle. Building camp, including bins, light aërial tramway, and sleigh road. Work started in October.

MONITOR (Alberni)—Installing compressor plant and constructing bins, wharf, etc., on Alberni Canal. Copper property; Samuel Ryder, owner; James L. Skene, superintendent.

MOORE (Barkerville)—A. Moore and associates obtained control of old placer property this fall and have been preparing to operate.

BLUE GROUSE (Cowichan district)—Shipped two carloads of ore to Trail smeltery.

FIDDLER CREEK GOLD (Dorreen)—Reorganizing company. Expect to develop further in 1919 and install power plant and concentrator.

HARRIS (Hazelton)—Will start work at mine this winter. Duke Harris in charge.

ARLINGTON (Kaslo)—M. Davys, lessee, shipping high-grade ore to Trail smeltery. Expects to erect mill to treat lower-grade material.

SILVER STANDARD (New Hazelton)—Fifty-ton mill built last winter operated for last eight months. Ore high grade, concentrating about five to one. Products are high-grade lead concentrates, shipped to Trail smeltery, and zinc-silver concentrates, shipped to U. S. Zinc Co., Sand Springs, Okla. Mill run only one shift, owing to lack of men. Ore hauled from mine 2½ miles by Packard 3½-ton truck. Principal owner, Brig. Gen. J. W. Stewart, director general of transportation for British Army. W. G. Norrie-Lowenthal is manager.

LUCKY FOUR (St. Elmo)—Building camp, including 10-mile road, prospecting and stripping copper ledge. Driving crosscut adit. Owners, Sperry & White, Seattle. Superintendent, A. S. Williamson.

SILVERSMITH (Sandon)—Returns on two carloads of crude ore and two of concentrates shipped to Trail smeltery netted $24,284, with 10% still due, pending final settlement.. Five other carloads also shipped. In storage at mill are 100 tons of silver-lead concentrates and 600 tons of zinc concentrates. All materials, except one carload, produced since mill was started on Oct. 5 last. Development pushed prior to that date.

BABINE-BONANZA (Smithers) — Will build tramway and small concentrator next spring. James Cronin is superintendent.

D. D. MANN (Stewart)—Has gold-silver property under bond on Salmon River. Prospected during last season.

IRON KING (Vancouver)—Construction of spur track to railroad finished Oct. 15. Installing steam shovel and other equipment for mining iron ore. Near Alta Lake on P. G. E. Ry. Owners, J. H. Thompson and associates.

LYNN VALLEY COPPER-GOLD (North Vancouver)—Building ore bins and camp buildings; also automobile road. W. F. Dunphy in charge.

**Ontario**

OTISSE (Fort Matachewan)—Will open up on more extensive scale. Only property in new camp on which much work has been done or is projected.

LAKE SHORE (Kirkland Lake) — Treated 1820 tons of ore in November and recovered $49,500.

JUPITER (Porcupine)—Control vested in McIntyre being wound up, under voluntary liquidation. General shareholders' meeting in Montreal Dec. 27.

PLENAURUM (Porcupine)—Under option to McIntyre. Work delayed by heavy flow of water and influenza. Option expired Dec. 31.

**Manitoba**

MANDY (Schist Lake)—Mined 10,000 tons last season, which will be hauled to head of navigation during winter and shipped by boat next summer.

## MEXICO

**Baja California**

COMPAGNIE DU BOLEO (Santa Rosalia)—November production was 2,072,324 lb. of copper.

## HONDURAS

OPTECA MINE, in Department of Comayagua will be opened up by American company. Will build dam across Humuya River for hydro-electric plant to supply power to mine and mill, three miles away. Work begun. Property silver-gold.

# The Market Report

### SILVER AND STERLING EXCHANGE

| Dec. | Sterling Exchange | Silver New York, Cents | Silver London, Pence | Dec. Jan. | Sterling Exchange | Silver New York, Cents | Silver London, Pence |
|---|---|---|---|---|---|---|---|
| 26 | 4.7580 | 101⅛ | .... | 30 | 4.7580 | 101⅛ | 48 11/16 |
| 27 | 4.7580 | 101⅛ | .... | 31 | 4.7585 | 101⅛ | 48 11/16 |
| 28 | 4.7580 | 101⅛ | 48 11/16 | 1 | ..... | .... | .... |

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine.

### DAILY PRICES OF METALS IN NEW YORK

| Dec. Jan. | Copper Electrolytic | Tin Spot. | Lead N. Y. | Lead St. L. | Zinc St. L. |
|---|---|---|---|---|---|
| 26 | * | † | 5⅛ | 5.35 | 7.50 @7.60 |
| 27 | * | † | 5⅛ | 5.10 | 7.50 @7.60 |
| 28 | * | † | 5⅛ | 5.10 | 7.45 @7.55 |
| 30 | * | † | 5⅛ @5⅜ | 5⅛ @5⅛ | 7.47½ @7.52½ |
| 31 | * | † | 5⅛ @5⅜ | 5⅛ @5⅛ | 7.40 @7.50 |
| 1 | .... | ... | ..... | ..... | ..... |

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for the deliveries constituting the major markets, reduced to basis of New York, cash, except where St. Louis is the normal basing point.

Quotations for spelter are for ordinary Prime Western brands. We quote New York price at 35c. per 100 lb. above St. Louis.

* No market. Producers ask 26c. No buyers.

† No market. Major supplies held for distribution at an arbitrary price of 72½c.

### LONDON

| Dec. Jan. | Copper Standard Spot | Copper Standard 3 M. | Copper Electrolytic | Tin Spot | Tin 3 M. | Lead Spot | Lead 3 M. | Zinc Spot |
|---|---|---|---|---|---|---|---|---|
| 26 | (b) | ... | ... | .... | .... | .... | .... | .. |
| 27 | (b) | ... | ... | .... | .... | .... | .... | .. |
| 28 | (b) | ... | ... | .... | .... | .... | .... | .. |
| 30 | 112 | 100 | 122 | 250 | 243 | 40½ | 39½ | 56 |
| 31 | (a) | (a) | (a) | (a) | (a) | (a) | (a) | (a) |
| 1 | (b) | ... | ... | .... | .... | .... | .... | .. |

(a) Not received. (b) Holiday.

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb.

The quotations for copper have come in a rather confused way this week. We have given the mean of the figures cabled. The figures will be subject to correction when more definite information is received.

## Metal Markets

**NEW YORK—Dec. 31, 1918**

Conditions are very slow in clearing up. There was not much progress this week. Important developments are expected to begin, however, with the advent of the new year. With the expiration of the authority of the War Industries Board at the end of Dec. 31, all price-fixing agreements become illegal, except as they are permitted by the Webb Act, and the Government intimated that it will prosecute any infractions of the Sherman Law.

Europe makes no inquiries for metals in this market. There are shrewd suspicions that the European governments will arrange to use up their own stocks before they buy any more supplies.

The London metal prices for Dec. 24 are: Spot copper, £112; 3 mo., £100; spot tin, £264; 3 mo., £256; spot lead, £40½; 3 mo., £39½; spot zinc, £56.

## Copper

**Copper**—The Export Association has announced 23c. as its price, but so far that is more a wish than a realization. There was, perhaps, some thought that this would be an intimation to domestic consumers, but the latter laughed at the idea of buying copper at present. In general, the same conditions as in the previous week continued to prevail, and we report simply "No market."

The selling committee of the Copper Export Association comprises Joseph Clendenin, chairman, T. Wolfson (Anaconda), C. A. Austin (Phelps Dodge Corporation), and F. S. Gourley (Calumet & Hecla). The office is at 60 Broadway, New York.

**Copper Sheets**—The base price of copper sheets is 35@36c. per lb. Copper wire is quoted at 25½c. per lb. f.o.b. mill, carload lots.

## Lead

**Lead**—Lead was offered at lower prices from day to day, which offers resulted in only small business. On Dec. 30 the American Smelting and Refining Co. reduced its price to 6c. Since then there has been some irregularity, lead continuing to be offered at low prices from some quarters, while bids at higher prices, that were unaccepted, were received in other quarters, and actual transactions were made at a variety of prices. Such a temporary irregularity is not surprising, in view of the generally chaotic conditions.

## Tin

**Tin**—No change in the general situation. Scarcely any outside business was done.

In London on Nov. 25 the public stocks of tin totalled 475 tons, made up as follows: Straits and Australian, 395 tons; Chinese, 5 tons; and English, 75 tons. In Liverpool on the same date the stocks were 1186 tons, as follows: Straits, 930 tons; Banca, 10 tons; English refined, 34 tons; common, 212 tons.

The British Ministry of Munitions recently announced the following stocks of imported metals (exclusive of old metal and scrap) in Great Britain and in possession of the ministry: Copper, 27,530 long tons; common spelter, 18,768 tons; refined spelter, 6544 tons; aluminum, 10,215 tons; pig lead, 40,111 tons; nickel, 1735 tons; antimony, 3303 tons.

## Zinc

**Zinc**—Business was very light. What was reported was wholly for prompt and January shipment, which business was done at gradually declining prices, with 7.40@7.50c. being representative at the close. Producers would like to sell three-months contracts, but, while they would accept 7¾c. for such, no actual business developed. While buyers in this market are conspicuous by their absence, there is no great pressure to sell.

The condition in the zinc market is also reflected in the reports from Platteville, Wis., and Joplin, Mo., where, in the first mentioned place, zinc ore is unquotable.

**Zinc Sheets**—Changed to $13 per 100 lb. from and after Jan. 1, 1919.

## Other Metals

**Aluminum**—Unchanged at 33c. per lb.

**Antimony**—There was further weakness in this market, with offerings at 7¼c., which we quote at the close.

**Bismuth**—Metal of the highest purity for pharmaceutical use is quoted at $3.50 per lb. for wholesale lots—500 lb. and over.

**Cadmium**—Quoted at $1.50@1.75 per pound.

**Nickel**—Market quotation: Ingot, 40c.; shot, 43c.; electrolytic, 45c. per pound.

**Quicksilver**—Dull and unsettled at $115. No quotation from San Francisco was received today.

## Silver and Platinum

**Silver**—Stationary at the fixed price. New York official, $1.01⅛ per oz. 1000 fine.

The demand for the East still continues. The mintage of the English silver coinage for the last year has been very large. The figures for the issue have not yet been released, but they will represent several million pounds sterling. London shipments week ended Dec. 28 were 520,000 ounces.

Mexican dollars at New York: Dec. 26, 77½; Dec. 27, 77½; Dec. 28, 77½; Dec. 30, 77½; Dec. 31, 77½. Jan. 1, ——.

**Platinum**—Refined ingot is quoted at $105.

**Palladium**—Quoted at $125.

## Zinc and Lead Ore Markets

**Platteville, Wis., Dec. 28**—Zinc-ore market unquotable. One or two cars of premium-grade blende sold at $55 per ton. No sales of lead ore are reported. Shipments for the week were 979 tons blende and 52 tons sulphur ore. For the year to date the totals are 120,854 tons blende, 7791 tons galena and 39,575 tons sulphur ore. During the week, 2163 tons blende was shipped to separating plants.

**Joplin, Mo., Dec. 28**—Blende, per ton, high, $47.80; basis 60% zinc, premium, $55; Class B, $44; Prime Western, $42.50; sludge and flotation, $40@37.50; calamine, basis 40% zinc, $30. Average selling prices: Blende, $42.95; calamine, $36.33; all zinc ores, $42.47. Lead, high, $99.50; basis 80% lead, $80@65; average selling price, all grades of lead, $81.97 per ton. Shipments the week: Blende, 6109; calamine, 477; lead, 1202 tons. Value, all ores the week, $378,170. Shipment the year: Blende, 469,327; calamine, 22,133; lead, 75,588 tons. Value all ores the year, $31,881,240.

Producers have closed new arrangements with the manufacturers of rolled zinc for a base price of $55 for blende on a 15c. price for sheets. Some ore was purchased this week, and will be allocated for next week's delivery.

During four years ending with 1916 the average weekly tonnage of ore shipped was 5442. The following two years the average was 8790 tons per week. The production still continues around 8000 tons per week. Some are wondering if conditions warrant a continuation of this tonnage, with the war demand closed. Stock in the bins, partly sold, aggregates approximately 20,000 tons of blende.

Lead prices were lowered to $65 at the week-end, a drop of $15 per ton.

## Other Ores

**Manganese, Chrome and Tungsten**—Unchanged.

## Other Minerals

**Pyrites**—Spanish pyrites is quoted, subject to the raising of the embargo, at 16½c. on the basis of 10s. ocean freight. Restrictions still continue. Unchanged.

## Iron Trade Review

**NEW YORK—Dec. 31, 1918**

The new year opens with fresh evidences of slackening activity throughout the steel trade, according to "Iron Age." In the holidays there have been many shut-downs for repairs, but resumptions this week at a number of mill centers have not been with full forces, and the prospects in some lines are that a further slowing down may come.

In every quarter the question of the readjustment of contracts to the lower prices adopted two weeks ago by leading sellers is uppermost. Pig-iron producers set out to hold to the old prices, but in the last week the calls upon them for the revision

of contracts have grown in numbers and in urgency. Some furnace companies seem inclined to yield, while others strenuously insist that contracts be carried out as written. The falling off of foundry operations is a factor to which more consideration is being given, however, and the adoption of the lower basis for pig iron has found more favor than was indicated a week ago.

That some blast furnaces will not long operate with $3 taken from their market price is evident, and the readjustments in finished material will likewise impose some hard choices on high-cost mills which must buy their raw materials in the market.

The annual statistics of "Iron Age" show that 44 new openhearth steel furnaces were completed and put in operation in 1918, with an annual capacity of 1,945,000 tons, against 4,326,000 tons a year for that added in 1917. New steel capacity projected for 1919 or now under construction represents only 1,130,000 tons a year, and at that is more than the industry calls for under the present conditions. Blast furnace construction is more in line with steel requirements than for several years. Eight furnaces were completed in 1918 with a capacity of 1,440,000 tons a year, while seven are now under construction, representing 1,260,000 tons a year.

### PITTSBURGH—Dec. 30

The iron and steel market is extremely quiet in all its branches, with the exception of sheets, which have been moderately active. Although the season of the year would account of the dullness, the common view is that in large part it reflects the unsettlement caused by the war's ending, and the delay that must occur before business can be resumed in full force. After about the middle of January, buying for ordinary requirements will probably be resumed, but heavy buying, in connection with construction jobs and other investments, must necessarily await the settlement of various matters.

Perhaps the most interesting feature of this dull market is the fact that the blast furnaces have not accepted the suggestion, involved in the schedule of price reductions that had been formulated for presentation to the War Industries Board Dec. 11, that pig-iror. prices be reduced $3 a ton. Western Pennsylvania and Valley furnaces are nominally quoting the same prices as formerly. Practically they are quoting no prices, since there is no inquiry to speak of, and there is the circumstance that the furnaces having less freight to Pittsburgh than the Valley rate are disposed to quote on a Valley basis. Several Alabama furnace interests have reduced their quotations $3 a ton, to $31, Birmingham, for No. 2 foundry, but even this reduction does not make their iron competitive with northern, on account of the freight differentials, as the Birmingham-to-Pittsburgh rate is $5.70 making $31, Birmingham, equal to $36.70, Pittsburgh, whereas $34, Valley, is $35.40 Pittsburgh.

Steel mills have been shipping heavily against specifications previously filed, and most buyers are fairly well supplied with steel. In wire products, in particular, shipments have been such that jobbers are disposed to call a halt. The most promising branch of the finished steel trade is the sheet branch, which is in receipt of fairly heavy specifications, particularly from automobile makers, and expects to operate at about 85% capacity in January.

## Steel

**Steel**—There are offerings of soft steel at the new prices, $43.50 for billets, $46 to $47 for sheet bars and small billets, and $46 for slabs, but there is hardly any buying. Discard steel is being offered rather freely. The Government has considerable quantities, arising out of adjustments upon the termination of shell contracts, but is trying to dispose of the material in such manner as to disturb the market as little as possible.

## Ferroalloys

**Ferroalloys**—The ferromanganese market is a long way from finding a definite level. Consumers are thinking more of cancelling contracts than of making fresh purchases. Furnaces refuse to cancel except on the payment of heavy damages, one producer offering to cancel a contract calling for 70% at $250 by the payment of $100 cash per ton. Consumers desire that the manufacture of 80% alloy should be resumed, but furnaces are opposed. Resale lots recently offered have been withdrawn, as they elicited no bids.

## Coke

**Coke**—It seems to be established that the Fuel Administration's control of coke prices will be continued to Feb. 1 at least. If the limitation was withdrawn, coke would probably advance, as it is scarce.

### MONTHLY AVERAGE PRICES OF METALS

| Silver | New York | | | London | | |
|---|---|---|---|---|---|---|
| | 1916 | 1917 | 1918 | 1916 | 1917 | 1918 |
| Jan. | 56.775 | 75.630 | 88.702 | 26.960 | 36.682 | 44.356 |
| Feb. | 56.755 | 77.585 | 85.716 | 26.975 | 37.742 | 42.792 |
| Mar. | 57.935 | 73.861 | 88.082 | 27.597 | 36.410 | 43.620 |
| April | 64.415 | 73.875 | 95.346 | 30.662 | 36.963 | 47.215 |
| May | 74.269 | 74.745 | 99.505 | 35.477 | 37.940 | 48.980 |
| June | 65.024 | 76.971 | 99.500 | 31.060 | 39.065 | 48.875 |
| July | 62.940 | 79.010 | 99.625 | 30.000 | 40.110 | 48.813 |
| Aug. | 66.083 | 85.407 | 100.292 | 31.498 | 43.418 | 49.077 |
| Sept. | 68.515 | 100.740 | 101.125 | 32.584 | 50.920 | 49.500 |
| Oct. | 67.855 | 87.332 | 101.125 | 32.361 | 44.324 | 49.500 |
| Nov. | 71.604 | 85.891 | 101.125 | 34.192 | 43.584 | 48.969 |
| Dec. | 75.765 | 85.960 | 101.125 | 36.410 | 43.052 | 48.492 |
| Year | 65.661 | 81.417 | 96.772 | 31.315 | 40.851 | 47.516 |

New York quotations cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 925 fine.

| Copper | New York | | London | | | |
|---|---|---|---|---|---|---|
| | Electrolytic | | Standard | | Electrolytic | |
| | 1917 | 1918 | 1917 | 1918 | 1917 | 1918 |
| Jan. | 28.673 | 23.500 | 131.921 | 110.000 | 142.895 | 125.000 |
| Feb. | 31.750 | 23.500 | 137.895 | 110.000 | 148.100 | 125.000 |
| Mar. | 31.481 | 23.500 | 136.750 | 110.000 | 151.000 | 125.000 |
| April | 27.935 | 23.500 | 133.842 | 110.000 | 147.158 | 125.000 |
| May | 28.788 | 23.500 | 130.000 | 110.000 | 142.000 | 125.000 |
| June | 29.962 | 23.500 | 130.000 | 110.000 | 142.000 | 125.000 |
| July | 26.620 | 25.904 | 128.409 | 119.913 | 140.409 | 134.913 |
| Aug. | 25.380 | 26.000 | 122.391 | 122.000 | 137.000 | 137.000 |
| Sept. | 25.073 | 26.000 | 117.500 | 122.000 | 135.250 | 137.000 |
| Oct. | 23.500 | 26.000 | 110.000 | 122.000 | 125.000 | 137.000 |
| Nov. | 23.500 | 26.000 | 110.000 | 122.000 | 125.000 | 137.000 |
| Dec. | 23.500 | (a) | 110.000 | ..... | 125.000 | ..... |
| Year | 27.180 | 24.628 | 124.892 | ..... | 138.401 | ..... |

(a) No Marked.

| Tin | New York | | London | |
|---|---|---|---|---|
| | 1917 | 1918 | 1917 | 1918 |
| January | 44.175 | 85.500 | 185.813 | 293.227 |
| February | 51.420 | 92.000 | 198.974 | 311.525 |
| March | 54.388 | (a) | 207.443 | 318.875 |
| April | 55.910 | (a) | 220.171 | 329.905 |
| May | 63.173 | (a) | 245.114 | 364.217 |
| June | 62.053 | (a) | 242.083 | 331.925 |
| July | 62.570 | (a) | 242.181 | 360.347 |
| August | 62.681 | (a) | 243.978 | 380.900 |
| September | 61.542 | (a) | 244.038 | 343.905 |
| October | 61.851 | (a) | 247.467 | 335.543 |
| November | 74.740 | (a) | 274.943 | 323.550 |
| December | 87.120 | (a) | 298.556 | ..... |
| Av. year | 61.802 | 88.750 | 237.563 | ..... |

(a) No average computed.

| Lead | New York | | St. Louis | | London | |
|---|---|---|---|---|---|---|
| | 1917 | 1918 | 1917 | 1918 | 1917 | 1918 |
| January | 7.626 | 6.782 | 7.530 | 6.684 | 30.500 | 29.00 |
| February | 8.636 | 6.973 | 8.595 | 6.899 | 30.500 | 29.00 |
| March | 9.199 | 7.201 | 9.120 | 7.091 | 30.500 | 29.00 |
| April | 9.288 | 6.772 | 9.158 | 6.701 | 30.500 | 29.00 |
| May | 10.207 | 6.818 | 10.202 | 6.704 | 30.500 | 29.00 |
| June | 11.171 | 7.611 | 11.123 | 7.511 | 30.500 | 29.00 |
| July | 10.710 | 8.033 | 10.644 | 7.750 | 30.500 | 29.00 |
| August | 10.594 | 8.050 | 10.518 | 7.750 | 30.500 | 29.00 |
| September | 8.680 | 8.050 | 8.611 | 7.750 | 30.500 | 29.00 |
| October | 6.710 | 8.050 | 6.650 | 7.750 | 30.500 | 29.00 |
| November | 6.249 | 8.050 | 6.187 | 7.750 | 30.500 | 31.20 |
| December | 6.375 | 6.564 | 6.312 | 6.324 | 30.500 | ..... |
| Year | 8.787 | 7.413 | 8.721 | 7.222 | 30.500 | ..... |

| Spelter | New York | | St. Louis | | London | |
|---|---|---|---|---|---|---|
| | 1917 | 1918 | 1917 | 1918 | 1917 | 1918 |
| January | 9.619 | 7.836 | 9.449 | 7.661 | 48.329 | 54.000 |
| February | 10.045 | 7.814 | 9.875 | 7.639 | 47.000 | 54.000 |
| March | 10.300 | 7.461 | 10.130 | 7.286 | 47.000 | 54.000 |
| April | 9.459 | 7.890 | 9.289 | 6.715 | 54.632 | 54.000 |
| May | 9.362 | 7.314 | 9.192 | 7.114 | 54.000 | 54.000 |
| June | 9.371 | 8.021 | 9.201 | 7.791 | 54.000 | 54.000 |
| July | 8.643 | 8.688 | 8.473 | 8.338 | 54.000 | 54.000 |
| August | 8.360 | 8.985 | 8.190 | 8.635 | 54.000 | 54.000 |
| September | 8.136 | 9.442 | 7.966 | 9.092 | 54.000 | 54.000 |
| October | 7.983 | 8.801 | 7.813 | 8.451 | 54.000 | 54.000 |
| November | 7.847 | 8.491 | 7.672 | 8.141 | 54.000 | 54.100 |
| December | 7.685 | 8.163 | 7.510 | 7.813 | 54.000 | ..... |
| Year | 8.901 | 8.159 | 8.813 | 7.890 | 52.413 | ..... |

New York and St. Louis quotations, cents per pound. London, pounds sterling per long ton.

| Pig Iron, Pgh. | Bessemer‡ | | Basic‡ | | No. 2 Foundry | |
|---|---|---|---|---|---|---|
| | 1917 | 1918 | 1917 | 1918 | 1917 | 1918 |
| January | $35.95 | $37.25 | $30.95 | $33.95 | $30.95 | $33.95 |
| February | 36.37 | 37.25 | 30.95 | 33.95 | 30.95 | 33.95 |
| March | 37.37 | 37.25 | 33.49 | 33.95 | 35.91 | 33.95 |
| April | 42.23 | 36.15 | 38.90 | 32.95 | 40.06 | 33.95 |
| May | 46.94 | 36.20 | 42.84 | 33.00 | 43.60 | 34.00 |
| June | 54.22 | 36.36 | 50.05 | 33.16 | 50.14 | 34.16 |
| July | 57.45 | 36.60 | 53.80 | 33.40 | 53.95 | 34.40 |
| August | 54.17 | 36.60 | 50.37 | 33.40 | 53.95 | 34.40 |
| September | 46.40 | 36.60 | 42.24 | 33.40 | 48.58 | 34.40 |
| October | 37.25 | 36.60 | 33.95 | 34.40 | 33.95 | 35.40 |
| November | 37.25 | 36.60 | 33.95 | 34.40 | 33.95 | 35.40 |
| December | 37.25 | 36.60 | 33.95 | 34.40 | 33.95 | 35.40 |
| Year | $43.57 | 36.67 | $39.62 | 33.70 | $40.83 | 34.45 |

‡ As reported by W. P. Snyder & Co.

### STOCK QUOTATIONS

| N. Y. EXCH.† | Dec. 30 |
|---|---|
| Alaska Gold M. | 3⅛ |
| Alaska Juneau | 1 |
| Am.Sm.&Ref.,com. | 74⅛ |
| Am.Sm. & Ref., pf. | 106 |
| Am.Sm.Sec., pf., A. | ‡92⅛ |
| Am. Zinc | 11 |
| Am. Zinc, pf. | 41⅛ |
| Anaconda | 59 |
| Batopilas Min. | 1⅛ |
| Bethlehem Steel | 60⅛ |
| Butte & Superior | 17 |
| Butte Cop. & Zinc | 5⅛ |
| Cerro de Pasco | 33 |
| Chile Cop | 17⅛ |
| Chino | 31⅛ |
| Colo. Fuel & Iron | 36⅛ |
| Crucible Steel | 56⅛ |
| Crucible Steel, pf. | 88⅛ |
| Dome Mines | 11 |
| Federal M. & S. | 9 |
| Federal M. & S., pf. | 37⅛ |
| Greater Nor., ore ctf | 31⅛ |
| Greene Cananea | 44 |
| Gulf States Steel | 59⅛ |
| Homestake | ‡94 |
| Inspiration Con. | 46⅛ |
| International Nickel | 32⅛ |
| Kennecott | 31⅛ |
| Lackawanna Steel | 66⅛ |
| Mexican Petrol. | 167⅛ |
| Miami Copper | 22⅛ |
| Nat'l Lead, com. | 62⅛ |
| National Lead, pf. | 105 |
| Nev. Consol. | 16⅛ |
| Ontario Min. | 7⅛ |
| Ray Con. | 20 |
| Republic I.&S.,com. | 73⅛ |
| Republic I.&S., pf. | ‡97 |
| Sloss-Sheffield | 50 |
| Tennessee C. & C. | 13 |
| U. S. Steel, com. | 94⅛ |
| U. S. Steel, pf. | 112⅛ |
| Utah Copper | 72⅛ |
| Va. Iron C. & C. | 57 |

| BOSTON CURB* | Dec. 30 |
|---|---|
| Alaska Mines Corp. | ‡.12 |
| Boston Ely | .90 |
| Boston & Mont. | .53 |
| Butte & Lon'n Dev. | .13 |
| Calaveras | 1⅛ |
| Chief Con. | 3⅛ |
| Contact | ‡.05 |
| Corbin | ‡.25 |
| Cortez | .14 |
| Crown Reserve | .27 |
| Crystal Cop. | .27 |
| Eagle & Blue Bell | 2⅛ |
| First Nat. Cop. | ‡2⅛ |
| Houghton Copper | .30 |
| Intermountain | ‡.05 |
| Iron Blossom | .48 |
| Iron Cap | 15⅛ |
| Majestic | .20 |
| Mexican Metals | .32 |
| Mines of America | ‡.75 |
| Mojave Tungsten | .05 |
| Nat. Zinc & Lead | .10 |
| Nevada-Douglas | .35 |
| New Baltic | 1 |
| New Cornelia | 16 |
| Oneco | .20 |
| Pacific Mines | ‡.35 |
| Rex Cons. | ‡.05 |
| Yukon Gold | ‡1 |

| SAN FRAN.* | Dec. 29 |
|---|---|
| Alta | ‡.03 |
| Andes | .03 |
| Best & Belcher | .01 |
| Caledonia | .01 |
| Challenge Con. | .03 |
| Confidence | .05 |
| Con. Virginia | .05 |
| Gould & Curry | ‡.01 |
| Hale & Norcross | .01 |
| Jacket-Cr. Pt. | .06 |
| Mexican | .02 |
| Occidental | .40 |
| Ophir | .02 |
| Overman | .01 |
| Savage | ‡.02 |
| Sierra Nevada | .08 |
| Union Con. | .03 |
| Utah Con. | ‡.01 |
| Belmont | 2.50 |
| Jim Butler | .35 |
| MacNamara | .31 |
| Midway | .19 |
| Mont.-Tonopah | .13 |
| North Star | .07 |
| Rescue Eula | ‡.07 |
| West End Con. | ‡1.20 |
| Atlanta | .04 |
| Booth | .13 |
| Comb. Frac. | $.02 |
| Florence | .12 |
| Jumbo Extension | .13 |
| Kewanas | .06 |
| Nevada Hills | .06 |
| Nevada Packard | .31 |
| Round Mountain | .24 |
| Silver Pick | .05 |
| White Caps | .09 |

| COLO. SPRINGS* | Dec. 29 |
|---|---|
| Cresson Con. | 5.00 |
| Doctor Jack Pot | .04⅛ |
| Elkton Con. | .06 |
| El Paso | .14 |
| Gold Sovereign | ‡.02 |
| Golden Cycle | 1.75 |
| Granite | .18⅛ |
| Isabella | .06⅛ |
| Mary McKinney | .07 |
| Portland | 1.00 |
| United Gold M. | .14⅛ |
| Vindicator | .44⅛ |

| BOSTON EXCH.† | Dec. 30 |
|---|---|
| Adventure | ‡.60 |
| Ahmeek | ‡71 |
| Algomah | ‡.30 |
| Alloues | 41⅛ |
| Ariz. Com. | ‡12⅛ |
| Arnold | ‡.20 |
| bingham Mines | 9⅛ |
| Bonanza | ‡.10 |
| Butte-Balakiava | ‡.30 |
| Calumet & Ariz. | 61 |
| Calumet & Hecla | 426 |
| Centennial | ‡14 |
| Copper Range | 40⅛ |
| Daly West | ‡2⅛ |
| Davis-Daly | 5 |
| East Butte | 9⅛ |
| Franklin | 3⅛ |
| Granby | ‡79 |
| Hancock | 5 |
| Hedley | ‡12 |
| Helvetia | ‡.20 |
| Indiana | ‡.80 |
| Isle Royale | 24 |
| Keweenaw | ‡1 |
| Lake | 4 |
| La Salle | ‡3 |
| Mason Valley | ‡2⅞ |
| Mass | 4 |
| Mayflower | 3 |
| Michigan | ‡3⅛ |
| Mohawk | 50⅛ |
| New Arcadian | ‡1⅛ |
| New Idria | 10 |
| North Butte | 10⅛ |
| North Lake | .55 |
| Ojibway | ‡1⅛ |
| Old Dominion | 33 |
| Osceola | 48 |
| Quincy | 59⅛ |
| St. Mary's M. L. | 40 |
| Santa Fe | .25 |
| Seneca | 15⅛ |
| Shannon | 2⅛ |
| Shattuck-Ariz. | 14⅛ |
| So. Lake | ‡1⅛ |
| So. Utah | .10 |
| Superior | 5⅛ |
| Superior & Bost. | 3 |
| Trinity | 2⅛ |
| Tuolumne | .77 |
| U. S. Smelting | 44⅛ |
| U. S. Smelting, pf. | 47 |
| Utah Apex | 3 |
| Utah Con. | 7⅛ |
| Utah Metal | 1⅛ |
| Victoria | 1⅛ |
| Winona | .90 |
| Wolverine | 18 |
| Wyandot | ‡.50 |

| N. Y. CURB† | Dec. 30 |
|---|---|
| Big Ledge | ⅛ |
| Butte & N. Y. | ⅛ |
| Butte Detroit | .02 |
| Caledonia | .28 |
| Calumet & Jerome | 1/16 |
| Can. Cop. Corpn. | 2⅛ |
| Carlisle | ‡2 |
| Cashboy | .08 |
| Con. Ariz. Sm. | 1⅛ |
| Con. Coppermines | 6 |
| Goldfield Con. | .21 |
| Goldfield Merger | .06 |
| Greenmonster | ‡⅛ |
| Hecla Min. | 4⅛ |
| Howe Sound | 4 |
| Jerome Verde | ‡.50 |
| Louisiana | ‡⅛ |
| Magma | .25 |
| Marsh | ‡.05 |
| McKinley-Dar-Sa. | ‡.47 |
| Milford | ‡.75 |
| Mother Lode | .35 |
| Nixon Nevada | .43 |
| Ohio Cop. | ‡.75 |
| Rawley | ‡2⅛ |
| Ray Hercules | 3⅛ |
| Richmond | ‡.56 |
| Rochester Mines | .27 |
| St. Joseph Lead | 11 |
| Standard S. L. | .25 |
| Stewart | .16 |
| Success | .07 |
| Tonopah | ‡3⅛ |
| Tonopah Ex. | 2⅛ |
| Tribullion | ‡1 |
| Troy Arizona | ‡.10 |
| United Eastern | 4⅛ |
| United Verde Ext. | ‡35⅛ |
| United Zinc | ‡⅛ |
| Utica Mines | ‡.08 |

| TORONTO* | Dec. 30 |
|---|---|
| Adanac | .10 |
| Bailey | .04 |
| Beaver Con. | .38 |
| Chambers Feriand | .10 |
| Coniagas | ‡2.00 |
| Hargraves | .02 |
| Kerr Lake | 5.37½ |
| La Rose | .18⅛ |
| Lake Shore | .90 |
| Min. Corp. of Can. | ‡2.00 |
| Nipissing | 8.75 |
| Peterson Lake | .08 |
| Temiskaming | .31 |
| Wettlaufer-Lor. | ‡.03 |
| Davidson | ‡.60 |
| Dome Exten. | .24 |
| Dome Lake | .17 |
| Hollinger | 6.00 |
| McIntyre | 1.62½ |
| Newray | .12⅛ |
| Porcu. Crown | .25 |
| Teck-Hughes | .30 |
| Vipond | .21 |
| West Dome | .14 |

* Bid prices. † Closing prices. ‡ Last quotations.